

# Iowa Green Streets Criteria



Version 4.0  
Updated December 2013

For the following project types:

- Community Facility
- Housing
- Sustainable Community Demonstration
- Main Street Challenge Grant

<http://iowaeconomicdevelopment.com/CommunityDevelopment/green>

# Table of Contents

Overview .....	4
How to Use This Document .....	4
Activities and Projects Covered by the Iowa Green Streets Criteria .....	5
Additional Requirements .....	5
Optional Points .....	6
Other Resources .....	6
<b>Iowa Green Streets Checklist.....</b>	<b>9</b>
<b>Section 1: Integrated Design.....</b>	<b>12</b>
Green Development Plan: Integrative Design Meeting(s) .....	12
Green Development Plan: Criteria Documentation.....	13
Applicant/Recipient, Architect/Project Designer and/or Contractor Certification .....	14
Universal Design: New Construction .....	15
Universal Design: Gut Rehabilitation and Rehabilitation .....	15
<b>Section 2: Site, Location and Neighborhood Fabric .....</b>	<b>16</b>
Smart Site Location – Proximity to Existing Development: New Construction .....	16
Smart Site Location – Protecting Environmental Resources: New Construction .....	16
Smart Site Location – Proximity to Services: New Construction .....	17
Compact Development: New Construction.....	18
Compact Development .....	19
Walkable Neighborhoods – Sidewalks and Pathways.....	19
Walkable Neighborhoods – Connections to Surrounding Neighborhood .....	20
Smart Site Location – Passive Solar Heating/Cooling.....	20
Smart Site Location – Grayfield, Brownfield or Adaptive Reuse Site .....	22
Transportation Choices .....	22
<b>Section 3: Site Improvements .....</b>	<b>23</b>
Environmental Remediation.....	23
Erosion and Sedimentation Control .....	24
Landscaping.....	25
Surface Water Management for Water Quality .....	26
Storm Drain Labels .....	27
<b>Section 4: Water Conservation .....</b>	<b>28</b>
Water-Conserving Appliances and Fixtures .....	28
No Irrigation.....	29
Water Reuse .....	29
<b>Section 5: Energy Efficiency .....</b>	<b>31</b>
Building Performance Standard: New Construction and Gut Rehabilitation: Single-Family and Multifamily Buildings ≤ 3 Stories .....	33
Building Performance Standard: New Construction and Gut Rehabilitation: Multifamily Buildings ≥ 4 Stories .....	39
Building Performance Standard: New Construction and Gut Rehabilitation: Mixed-Use with Residential.....	40
Building Performance Standard: New Construction and Gut Rehabilitation: Commercial .....	41
Building Performance Standard: Rehabilitation: Single-Family and Multifamily Buildings ≤ 3 Stories .....	42
ENERGY STAR and Energy Efficient Appliances .....	45
Efficient Lighting: Interior .....	45
Efficient Lighting: Common Areas and Emergency Lighting .....	46
Efficient Lighting: Exterior .....	46
HVAC Sizing and Installation and Duct Systems.....	47
Framing – Optimum Value Engineering (Advanced Framing).....	48
Project Data Collection and Monitoring System .....	50
Additional Reductions in Energy Use.....	50
Renewable Energy.....	51
Photovoltaic (PV) / Solar Hot Water Ready .....	51
Advanced Metering Infrastructure.....	52
ENERGY STAR Version 3.0.....	52
<b>Section 6: Materials Beneficial to the Environment .....</b>	<b>53</b>
Construction Waste Management.....	53
Construction Waste Management: Additional Diversion.....	53
Durable and Low Maintenance Exteriors .....	54
Recycled Content Material .....	54

Certified, Salvaged and Engineered Wood Products .....	55
Reducing Heat-Island Effect – Roofing.....	55
Reducing Heat-Island Effect – Paving .....	56
Reducing Heat-Island Effect – Plantings .....	57
<b>Section 7: Healthy Living Environment .....</b>	<b>58</b>
Low / No VOC Paints and Primers.....	58
Low / No VOC Adhesives and Sealants .....	58
Composite Wood Products that Emit Low / No Formaldehyde .....	60
Environmentally Preferable Flooring.....	60
Environmentally Preferable Flooring: Alternative Sources .....	61
Exhaust Fans – Bathroom .....	62
Exhaust Fans – Kitchen .....	63
Balanced Ventilation System .....	64
Water Heaters – Mold Prevention.....	65
Cold and Hot Water Pipe Insulation.....	66
Materials in Wet Areas – Surfaces.....	66
Materials in Wet Areas – Tub and Shower Enclosures .....	67
Basements and Concrete Slabs – Vapor Barrier .....	68
Basements and Concrete Slabs – Radon.....	69
Water Drainage.....	71
Garage Isolation.....	72
Clothes-Dryer Exhaust.....	73
Integrated Pest Management.....	73
Smoke-free Building.....	74
Combustion Equipment.....	74
(includes space and water-heating equipment) .....	74
<b>Section 8: Operations and Maintenance .....</b>	<b>75</b>
Building Maintenance Manual.....	75
Occupant Manual .....	76
Homeowner and Commercial/Public Building Tenant Orientation .....	76
<b>Appendix A.....</b>	<b>77</b>
Green Development Plan and Checklist.....	77
<b>Appendix B.....</b>	<b>83</b>
Certification of Intent to Comply.....	83
<b>Appendix C.....</b>	<b>84</b>
Certification of Construction Contract Document Compliance .....	84
<b>Appendix D.....</b>	<b>85</b>
Certification of Compliance at End of Construction .....	85
<b>Appendix E.....</b>	<b>86</b>
Energy Performance Certification .....	86
<b>Appendix F.....</b>	<b>88</b>
Energy Performance Certification - Rehabilitation.....	88
<b>Appendix G .....</b>	<b>89</b>
Project Plan and Spec Book Checklist .....	89

## Overview

The Iowa Green Streets Criteria promote public health, energy efficiency, water conservation, smart locations, operational savings and sustainable building practices. The Iowa Green Streets Criteria apply to Iowa Economic Development Authority Housing Fund, Community Development Block Grant Program Community Facilities and Services Fund, some Community Development Block Grant Disaster Recovery projects and Main Street Iowa Challenge Grant projects. As a result, the strategies in the following pages enhance affordable housing, community facilities, town centers and communities as a whole.

In addition to increasing resource efficiency and reducing environmental impacts, green building strategies can yield cost savings through long-term reduction in operating expenses. The benefits include improved energy performance and comfort, a healthier indoor environment, increased durability of building components, and simplified maintenance requirements that can lead to financial efficiencies for property managers and owners. Green building practices improve the economics of managing affordable housing, community facilities, and Main Street businesses while enhancing quality of life for residents, visitors and employees. When green building practices inform the location of our buildings — placing homes, community facilities and businesses near community amenities such as public transportation to create walkable, livable neighborhoods — the benefits for citizens and communities expand to include fewer sprawl-related transportation impacts.

Guiding principles behind the Iowa Green Streets Criteria ensure that buildings must be cost effective to build, and durable and practical to maintain. In addition, the principles work together to help produce green buildings that:

- Result in a high-quality, healthy living and working environment
- Lower utility costs
- Enhance connections to nature
- Protect the environment by conserving energy, water, materials and other resources
- Advance the health of local and regional ecosystems

## How to Use This Document

The Iowa Green Streets Criteria is based on the national [Green Communities Criteria](#). The Iowa Economic Development Authority thanks Enterprise and its partners for developing the national Green Communities Criteria and the use of those criteria in development of the Iowa Green Streets Criteria.

**All of the mandatory Iowa Green Streets Criteria are required for both residential and non-residential applications. However, there are certain criteria that are not applicable to or are different for non-residential applications. Therefore, certain criterion include different requirements for residential versus non-residential projects.**

Please be aware that this Iowa Green Streets Criteria document is subject to periodic revision and update. Refer to the Iowa Economic Development Authority's Community Development Division website, <http://iowaeconomicdevelopment.com/CommunityDevelopment/green> for updates.

(Note: The mandatory criteria referenced in this document are based on the national Green Communities Criteria as of February 2011. Any revisions to the national Green Communities Criteria will not apply to Iowa Economic Development Authority projects unless adopted by the Iowa Economic Development Authority and specifically addressed in the Iowa Green Streets Criteria.)

## Activities and Projects Covered by the Iowa Green Streets Criteria

The Iowa Green Streets Criteria include mandatory and optional components in the criteria for the following types of activities or projects.

- Multifamily new construction
- Multifamily “gut” rehabilitation<sup>1</sup> (see definition below)
- Multifamily rehabilitation<sup>2</sup> (see definition below)
- Single-family new construction
- Main Street Iowa Challenge Grant projects
- Community Development Block Grant Program Community Facility and Sustainable Community Demonstration projects, including disaster recovery projects (selected projects)

<sup>1</sup> *Gut Rehabilitation* – Gut rehabilitation is defined as an activity or project that involves extensive (substantial) rehabilitation in terms of total removal and replacement of all interior (non-structural) systems, equipment, components or features of the existing structure to be rehabilitated or converted, whereby the existing structure will be reduced (as part of the rehabilitation or conversion of the structure) down to the basic structure or exterior building shell (e.g., the foundation system; exterior walls; roofs; and interior structural components such as columns, beams, floors and structural bearing walls). Gut rehabilitation may also include structural and non-structural modifications to the exterior of the structure.

<sup>2</sup> *Rehabilitation* – Rehabilitation is defined as rehabilitation projects with rehabilitation activities that are less extensive than the gut rehabilitation definition above. **For multifamily, community facility, and Main Street Challenge Grant projects involving rehabilitation, the project shall implement all of the mandatory Iowa Green Streets Criteria that are applicable to that specific project.** For example, projects replacing interior light fixtures shall adhere to criterion 5-3a, Efficient Lighting Interior, and projects replacing bathroom exhaust fans shall adhere to criterion 7-5a, Exhaust Fans – Bathroom. Project applicants shall document for IEDA any mandatory criteria that will not be met and explain the reason for not meeting that criteria. ***All rehabilitation projects shall follow the appropriate Building Performance Standard Criterion either 5-1e, 5-1f or 5-1g.***

## Additional Requirements

In addition to the Iowa Green Streets Criteria, the following requirements, as applicable, apply to all activities and projects covered by the Iowa Green Streets Criteria.

- All newly constructed projects or activities shall be professionally designed, complete with a detailed set of construction plans and specifications that incorporate all applicable requirements of the Iowa Green Streets Criteria.
- All new construction projects and some rehabilitation projects are subject to the requirements of the International Energy Conservation Code (the most current version as adopted by the State Building Code).
- All new construction and rehabilitation activities or projects must meet the requirements of any and all locally adopted and enforced building codes, standards and ordinances. In the absence of locally adopted and enforced building codes, the building code requirements of the State Building Code shall apply.

## Optional Points

A significant number of optional criteria are also included in the green criteria for increasing the overall sustainability and energy performance of homes and buildings.

Depending on the program, the optional criteria account for up to approximately ten percent of the total project “score” during the application review and selection processes of the Iowa Economic Development Authority Community Development Block Grant Program and Main Street Challenge Grant programs.

Applications achieving the following ranges of optional criteria points will be considered to achieve a low, moderate or high level of additional green performance during application review and selection.

Optional Green Criteria Point Range	Level of Additional Green Performance
0 - 50 points	Low
51 - 100 points	Moderate
101 or more points	High

## Other Resources

Here are some additional resources to assist you with your green project:

- ❖ [AARP](#)
- ❖ [American Institute of Architects, Iowa Chapter](#)
- ❖ [Building Green, LLC/Environmental Building News](#)
- ❖ [Building Science Corporation](#)
- ❖ [Center on Sustainable Communities](#)
- ❖ [ENERGY STAR](#)
- ❖ [Fine Home Building](#)
- ❖ [Green Communities](#)
- ❖ [Green Home Guide](#)
- ❖ [InspectAMedia](#)
- ❖ [Iowa Department of Cultural Affairs](#)
- ❖ [Iowa Department of Public Health](#)
- ❖ [Iowa Energy Center](#)
- ❖ [Iowa State University Extension](#)
- ❖ [PATH](#)
- ❖ [Residential Energy Services Network \(RESNET\)](#)
- ❖ [U.S. Green Building Council](#)
- ❖ [University of Minnesota Center for Sustainable Building Research](#)

For even more resources, visit the Iowa Economic Development Authority’s Community Development Division web site <http://iowaeconomicdevelopment.com/CommunityDevelopment/green>.

**For additional information about the Iowa Green Streets Criteria, please call:**

**515-725-3069 or e-mail:**  
[greenstreets@iowa.gov](mailto:greenstreets@iowa.gov)

**Visit the website:**  
<http://iowaeconomicdevelopment.com/CommunityDevelopment/green>

## ***Section 1: Integrated Design***

An integrated design process incorporates sustainability up-front, uses a holistic and total-systems approach to the development process, and promotes good health and livability through the building's life cycle. The goal is to establish a written commitment that informs the project's objectives through the building's life cycle.

Sustainable building strategies should be considered from the moment the developer initiates the project. The professional development team should include a developer, architect, engineer, landscape architect, LEED™ Accredited Professional or experienced green building design specialist, contractor, and asset and property management staff. Whenever possible, the team also should include maintenance staff and occupant representatives. The team must be committed to environmentally responsive, resource conserving and healthy building principles and practices.

## ***Section 2: Site, Location and Neighborhood Fabric***

Location within existing communities – or contiguous to existing development – helps conserve land and the spread of stormwater runoff to new watersheds. It also reduces travel distances. Proper site selection avoids development of inappropriate sites and damage to or loss of fragile, scarce environmental resources. The greatest savings come from developing in areas that already have infrastructure and civic amenities. Site selection is also an opportunity to clean up and redevelop brownfields, and restore the land and infill segmented communities.

Compact development encourages more resource-efficient development of land, reduces development costs and conserves energy. It also can contribute to creating more walkable, livable communities, while helping restore, invigorate and sustain livable development patterns. Making the streetscape safer and more inviting for walkers and bicyclists encourages alternative transportation choices to the automobile. Safer streets and streetscapes also promote physical activity and public health, while creating opportunities for social interaction and increased safety by bringing more eyes on public spaces.

## ***Section 3: Site Improvements***

Sustainable design and site planning integrate design and construction strategies to: minimize environmental site impacts; enhance human health; reduce construction costs; maximize energy, water, and natural resource conservation; improve operational efficiencies; and promote alternative transportation.

## ***Section 4: Water Conservation***

Water efficiency conserves finite fresh water resources and reduces utility bills. Significant water savings can be realized by specifying and installing water-efficient appliances and plumbing fixtures, implementing low-water landscape and irrigation strategies, and taking advantage of rainwater catchment and greywater sources.

## ***Section 5: Energy Efficiency***

Energy efficiency helps to maximize occupant comfort and health, while reducing utility bills. Conservation measures mitigate the accumulative burdens of energy production and delivery, extraction of nonrenewable natural resources, degradation of air quality, global warming and the increasing concentration of pollutants.

## ***Section 6: Materials Beneficial to the Environment***

Reducing, reusing and recycling building materials conserves natural resources and reduces emissions associated with manufacturing and transporting raw materials. Many techniques and building products on the market contribute to more durable, healthy and resource-efficient buildings.

## ***Section 7: Healthy Living Environment***

The importance of a healthy living environment is a significant green building issue directly affecting occupants. Creating a healthy living environment involves the use of materials that do not cause negative health impacts for residents or workers, especially for more sensitive groups such as children, seniors and individuals with existing respiratory problems and compromised immune systems.

## ***Section 8: Operations and Maintenance***

Operations and maintenance (O&M) practices impact the building owner's costs and residents' health, comfort and safety. Sustainable building O&M practices enhance resident health and operational savings. The key to successful building performance is the integration of O&M plans, education and cost-effective, low-maintenance design.

# Iowa Green Streets Checklist

## Section 1: Integrated Design Process

Y	N	Item #	Item Title	Points
		1.1a	Green Development Plan: Integrative Design Meeting(s)	Mandatory
		1.1b	Green Development Plan: Criteria Documentation	Mandatory
		1.2	Applicant/Recipient, Architect/Project Designer, and/or Contractor Certification	Mandatory
		1.3a	Universal Design: New Construction	5
		1.3b	Universal Design: Gut Rehabilitation and Rehabilitation	Up to 8

## Section 2: Location and Neighborhood Fabric

Y	N	Item #	Item Title	Points
		2.1a	Smart Site Location — Proximity to Existing Development	Mandatory
		2.1b	Smart Site Location — Protecting Environmental Resources	Mandatory
		2.1c	Smart Site Location — Proximity to Services	Mandatory
		2.2a	Compact Development: New Construction	25
		2.2b	Compact Development	5
		2.3	Walkable Neighborhoods – Sidewalks and Pathways	Mandatory
		2.4	Walkable Neighborhoods – Connections to Surrounding Neighborhood	5
		2.5a	Smart Site Location — Passive Solar Heating/Cooling	7
		2.5b	Smart Site Location — Grayfield, Brownfield or Adaptive Reuse Site	15
		2.6	Transportation Choices	12

## Section 3: Site Improvements

Y	N	Item #	Item Title	Mandatory / Optional
		3.1	Environmental Remediation	Mandatory
		3.2	Erosion and Sedimentation Control	Mandatory
		3.3	Landscaping	Mandatory
		3.4	Surface Water Management	Mandatory / Optional
		3.5	Storm Drain Labels	2

## Section 4: Water Conservation

Y	N	Item #	Item Title	Mandatory / Optional
		4.1	Water-Conserving Appliances and Fixtures	Mandatory
		4.2	No Irrigation	Mandatory
		4.3	Water Reuse	Up to 10

### Section 5: Energy Efficiency

Y	N	Item #	Item Title	Mandatory / Optional
		5.1a	Building Performance Standard: New Construction and Gut Rehabilitation: Single-Family and Multifamily Buildings ≤ 3 Stories	Mandatory
		5.1b	Building Performance Standard: New Construction and Gut Rehabilitation: Multifamily Buildings ≥ 4 Stories	Mandatory
		5.1c	Building Performance Standard: New Construction and Gut Rehabilitation: Commercial and Mixed-Use with Residential	Mandatory
		5.1d	Building Performance Standard: New Construction and Gut Rehabilitation: Commercial	
		5.1e	Building Performance Standard: Rehabilitation: Single-Family and Multifamily Buildings ≤ 3 Stories	Mandatory
		5.1f	Building Performance Standard: Rehabilitation: Multifamily ≥ 4 Stories	Mandatory
		5.1g	Building Performance Standard: Rehabilitation: Commercial	Mandatory
		5.2	ENERGY STAR and Energy Efficient Appliances	Mandatory
		5.3a	Efficient Lighting – Interior	Mandatory
		5.3b	Efficient Lighting: Common Areas & Emergency Lighting	Mandatory
		5.3c	Efficient Lighting – Exterior	Mandatory
		5.4	HVAC Sizing and Installation and Duct Systems	Mandatory
		5.5	Optimum Value Engineering (Advanced Framing)	Mandatory
		5.6	Project Data Collection and Monitoring System	35
		5.7	Additional Reductions in Energy Use	Up to 80
		5.7a	Renewable Energy	15
		5.7b	Photovoltaic (PV) / Solar Hot Water Ready	5
		5.8	Advanced Metering Information	5
		5.9	ENERGY STAR Version 3.0	25

### Section 6: Materials Beneficial to the Environment

Y	N	Item #	Item Title	Mandatory / Optional
		6.1a	Construction Waste Management	Mandatory
		6.1b	Construction Waste Management: Additional Diversion	Up to 15
		6.2	Durable & Low Maintenance Exteriors	Mandatory
		6.3	Recycled Content Material	Up to 10
		6.4	Certified, Salvaged and Engineered Wood	5
		6.5a	Reduce Heat-Island Effect – Roofing	5
		6.5b	Reduce Heat-Island Effect – Paving	5
		6.5c	Reduce Heat-Island Effect – Plantings	5

### **Section 7: Healthy Living Environment**

<b>Y</b>	<b>N</b>	<b>Item #</b>	<b>Item Title</b>	<b>Mandatory / Optional</b>
		7.1	Low/No VOC Paints & Primers	Mandatory
		7.2	Low/No VOC Adhesives & Sealants	Mandatory
		7.3	Composite Wood Products that Emit Low / No Formaldehyde	Mandatory
		7.4a	Environmentally Preferable Flooring	Mandatory
		7.4b	Environmentally Preferable Flooring: Alternative Sources	5
		7.5a	Exhaust Fans – Bathroom	Mandatory
		7.5b	Exhaust Fans – Kitchen	Mandatory / Optional
		7.6	Balanced Ventilation System	Mandatory / Optional
		7.7	Water Heaters – Mold Prevention	Mandatory
		7.8	Cold and Hot Water Pipe Insulation	Mandatory
		7.9a	Materials in Wet Areas – Surfaces	Mandatory
		7.9b	Materials in Wet Areas – Tub & Shower Enclosures	Mandatory
		7.10a	Basements & Concrete Slabs – Vapor Barrier	Mandatory
		7.10b	Basements & Concrete Slabs – Radon: New Construction	Mandatory
		7.11	Water Drainage	Mandatory
		7.12	Garage Isolation	Mandatory
		7.13	Clothes Dryer Exhaust	Mandatory
		7.14	Integrated Pest Management	Mandatory
		7.15	Smoke-Free Building	2
		7.16	Combustion Equipment (includes space & water-heating)	Mandatory

### **Section 8: Operations and Maintenance**

<b>Y</b>	<b>N</b>	<b>Item #</b>	<b>Item Title</b>	<b>Mandatory / Optional</b>
		8.1	Building Maintenance Manual	Mandatory
		8.2	Occupant Manual	Mandatory
		8.3	Homeowner/Commercial/Public Bldg Tenant Orientation	Mandatory

## Section 1: Integrated Design

1-1a

### Green Development Plan: Integrative Design Meeting(s)

MANDATORY

#### How

Conduct one or more integrative design meeting(s) as appropriate for the project and submit a completed Appendix A Green Development Plan or equivalent documentation outlining the design approach used that demonstrates involvement of the entire project team throughout the design and development process. Include the following in the Appendix A Green Development Plan submittal:

- A roster of the name and role of each member of the professional design and development team participating in the integrative design meeting
- A statement of the overall green development goals of the project and the expected intended outcomes from addressing those goals
- A summary of process used to select the green building strategies, systems, and materials
- A description of how each of the mandatory and optional items will be included in the project
- Identification of development team members responsible for implementing the green features
- A description of follow-up measures to be taken through completion of design, permitting, construction, and operation ensuring the green features are included and correctly installed, and that owners / tenants receive information about the function and operation of the features
- Meeting minutes or other documentation that captures and summarizes components of the integrative design process

#### Intent

An integrative design process can result in substantially lower development costs and greater health, economic, and environmental benefits for residents, property owners, and communities.

#### Recommendations

Conduct a design charrette with the full development team, including the following disciplines:

- Prospective or current residents or building occupants
- Architecture or residential or commercial building design
- Mechanical or energy engineering
- Building science or performance testing
- Green building or sustainable design
- Civil engineering, landscape architecture, habitat restoration, or land-use planning
- Building management and maintenance
- Environmental science
- Public health

#### Resources

- [Enterprise Green Communities Green Charrette Toolkit](#)
- [Whole Building Design Guide Integrated Design approach](#)

**How**

Create design and construction documentation (e.g., plans, details, specifications) to include information on implementation of appropriate Iowa Green Streets Criteria.

Use the Project Plan and Spec Book Checklist below to assist the project in incorporating all applicable Iowa Green Streets Criteria mandatory and optional measures into the project's plans and specifications. Provide the Project Plan and Spec Book Checklist and the Iowa Green Streets Criteria to all contractors and subcontractors and inform all contractors of need to comply with the criteria.

**Project Plan and Spec Book Checklist**

CRITERION	PROJECT PLANS	SPEC BOOK	Architect/ Designer Initials
1.1a-b Green Development Plan			
1.3a-b Universal Design	X	X	
2.1a-c Smart Site Location	X		
2.3 Walkable Neighborhoods: Sidewalks and Pathways	X		
2.4 Walkable Neighborhoods: Connections to Surrounding Neighborhoods	X		
2.5a Smart Site Location: Passive Solar Heating/Cooling	X	X	
2.5b Smart Site Location: Greyfield, Brownfield or Adaptive Reuse Site	X		
2.6 Transportation Choices	X		
3.1 Environmental Remediation		X	
3.2 Erosion and Sedimentation Control	X	X	
3.3 Landscaping	X	X	
3.4 Surface Water Management	X	X	
3.5 Storm Drain Labels		X	
4.1 Water Conserving Appliances and Fixtures	X	X	
4.3 Water Reuse	X	X	
5.1a-g Building Performance Standards	X	X	
5.1a-g Building Performance Standards – exterior rigid insulation requirement	X	X	
5.2 ENERGY STAR and Energy Efficient Appliances		X	
5.3a-b Efficient Lighting		X	
5.4 HVAC Sizing, Installation and Duct Systems	X	X	
5.5 Optimum Value Engineering (Advanced Framing)	X	X	
5.6 Project Data Collection and Monitoring System	X	X	
5.7 Additional Reductions in Energy Use	X	X	
5.7a Renewable Energy	X	X	
5.7b Photovoltaic / Solar Hot Water Ready	X	X	
5.8 Advanced Metering Infrastructure	X	X	
5.9 ENERGY STAR Version 3.0	X	X	
6.1a-b Construction Waste Management		X	
6.2 Durable and Low-Maintenance Exteriors	X	X	
6.3 Recycled Content Material		X	
6.4 Certified, Salvaged, and Engineered Wood Products		X	
6.5a-c Reducing Heat Island Effect		X	
7.1 Low/No VOC Paints and Primers		X	
7.2 Low/No VOC Adhesives and Sealants		X	
7.3 Composite Wood Products that Emit Low/No Formaldehyde		X	
7.4a-b Environmentally Preferable Flooring	X	X	
7.5a Exhaust Fans: Bathroom	X	X	
7.5b Exhaust Fans: Kitchen	X	X	
7.6 Balanced Ventilation System	X	X	
7.7 Water Heaters: Mold Prevention	X	X	
7.8 Cold and Hot Water Pipe Insulation	X	X	
7.9a-b Materials in Wet Areas	X	X	

7.10a Basements and Concrete Slabs: Vapor Barrier	X	X	
7.10b Basements and Concrete Slabs: Radon	X	X	
7.11 Water Drainage	X	X	
7.12 Garage Isolation	X		
7.13 Clothes Dryer Exhaust	X	X	
7.14 Integrated Pest Management	X	X	
7.15 Smoke Free Building		X	
7.16 Combustion Equipment	X	X	
8.1 Maintenance Manual			
8.2 Resident Manual			
8.3 Resident and Property Manager(s) Orientation			

1-2	<b>Applicant/Recipient, Architect/Project Designer and/or Contractor Certification</b>
	<b>MANDATORY</b>

**How**

The Architect/Project Designer, General Contractor, HVAC Contractor, and/or Applicant/Recipient are required to certify in writing at various stages of the development process their intention to comply, and actual compliance with all of the MANDATORY Iowa Green Streets Criteria, as follows:

- Certification of Intent to Comply at time of initial application – signed by Applicant and the Architect/Project designer. *See Appendix B for certification form.*
- Certification of Construction Contract Document Compliance – signed by Recipient and Architect/Project Designer and submitted to IEDA prior to construction bidding. *See Appendix C for certification form.*
- Project Plan and Spec book Checklist – signed by Architect/Project Designer and submitted to IEDA prior to construction bidding. *See Appendix G for form to submit.*
- Certification of Compliance at end of construction – signed by Recipient, Architect/Project Designer, General Contractor and HVAC Contractor. *See Appendix D for certification form.*
- Energy Performance Certification (as applicable) – signed by HERS rater or energy professional, Recipient and Architect/Project Designer. *See Appendix E for certification form.*
- Energy Performance Certification: Rehabilitation (as applicable) – signed by HERS rater or energy professional, Recipient and Architect/Project Designer. *See Appendix F for certification form.*

1-3a

## Universal Design: New Construction

**OPTIONAL**  
(5 Points)

### How

Design a minimum of 15% of the dwelling units (no fewer than one) in accordance with ICC/ANSI A117.1, Type A, Fully Accessible guidelines. The remainder of the ground-floor units and elevator-reachable units should be designed in accordance with ICC /ANSI A117.1, Type B.

### Intent

Universal design features result in a building that is sensitive to a wide range of resident needs, including those who have temporary or permanent disabilities. The creation of comfortable environments for a diverse population increases the likelihood of dynamic, diverse communities.

### Resources

- [Universal Design Checklist and Survey by University of Iowa Clinical Law Programs](#)
- [Universal Design Information from Iowa City, Iowa, www.icgov.org/default/?id=1169](#)
- [Aging-In Place Checklist](#)

1-3b

## Universal Design: Gut Rehabilitation and Rehabilitation

**OPTIONAL**  
(5 to 8 Points)

### How

Design a minimum of 10% of the dwelling units (no fewer than one) in accordance with ICC/ANSI A117.1, Type A, Fully Accessible guidelines. *[5 points]*

### AND, for 3 additional points:

- The remainder of the ground-floor units and elevator-reachable units should have accessible unit entrances (designed to accommodate wheelchair-bound people). *[3 points]*

### Intent

Universal design features result in a building that is sensitive to a wide range of resident needs, including those who have temporary or permanent disabilities. The creation of comfortable environments for a diverse population increases the likelihood of dynamic, diverse communities.

### Resources

- [Universal Design Checklist and Survey by University of Iowa Clinical Law Programs](#)
- [Universal Design Information from Iowa City, Iowa, www.icgov.org/default/?id=1169](#)
- [Aging-In Place Checklist](#)

## Section 2: Site, Location and Neighborhood Fabric

2-1a	<b>Smart Site Location – Proximity to Existing Development: New Construction</b>
	<b>MANDATORY</b> Except for Rehabilitation Projects

### How

Provide preliminary site map with your application demonstrating that the development is located on a site with access to existing roads, water, sewers and other infrastructure within or contiguous (having at least 25 percent of the perimeter bordering) to existing development. Do not build on tracts of land that require installing a septic tank or a sanitary sewer or water line extension of 1,000 feet or greater from the property line of the tract being developed, or within critical potable watershed areas.

### Intent

Location within existing communities, within or contiguous to existing development, helps conserve land and the spread of stormwater runoff to new watersheds. It also reduces travel distances. Proper site selection avoids development of inappropriate sites and damage to or loss of fragile, scarce environmental resources. The greatest savings come from developing in areas that already have infrastructure and civic amenities. Site selection is also an opportunity to clean up and redevelop brownfields and to fill in gaps within the built environment.

2-1b	<b>Smart Site Location – Protecting Environmental Resources: New Construction</b>
	<b>MANDATORY</b> Except for Certain Infill Sites* or Rehabilitation Projects

### How

Do not locate new development, including buildings, built structures, roads or other parking areas, on portions of sites that meet any of the following:

- Land in a wetland or within 100 feet of wetlands, including isolated wetlands or streams. Maintain or establish riparian buffer using native vegetation where possible. Bike and foot paths are allowed if at least 25 feet from the wetlands boundary.
- Land within 100 feet of critical slope area
- Prime farmland
- Public parkland
- Land that is specifically identified as habitat for any species on federal or state threatened or endangered lists
- Land with elevation at or below the 100-year floodplain
- Land outside the corporate limits of a municipality

***\*An infill site, which is exempted from 2-1b, is a site that has 75 percent of its perimeter bordering existing development or roads and has access to existing infrastructure.***

**Intent**

Proper site selection avoids development of inappropriate sites, and damage to or loss of fragile and scarce environmental resources.

**Definitions**

- “Wetlands” is defined by the U.S. Code of Federal Regulations, 40 CFR, Parts 230-233 and Part 22. New wetlands constructed as part of stormwater mitigation or other site restoration efforts are exempt from this part of the requirement.
- “Critical slope area” is an area within a tract of land that has a greater than 15 percent change in elevation or an erodability factor of greater than 0.4 as determined by the Natural Resources Conservation Service of the USDA.
- Prime farmland is defined here as land that contains “prime soils”, “unique soils”, or “soils of state significance” as identified in state Natural Resources Conservation Service soil surveys. Sites that are previously developed are exempt from this requirement.
- “Critical habitat” is an area that the U.S. Fish and Wildlife Service or a state or tribal authority designates as occupied by a threatened or endangered species, or essential to the conservation of a threatened or endangered species. See, for example, Endangered Species Act, 16 U.S.C. 1523(5).
- The “100-year flood plain” is defined by FEMA in the Agency’s national flood information map. The 100-year flood plain is shown by the Flood Insurance Rate Map (FIRM) for the community published by FEMA. If no FIRM exists, contact the Iowa Department of Natural Resources (IDNR) Flood Plain Management Program for a determination. The IDNR contact for your area can be determined at [www.iowadnr.gov/water/floodplain/contact.html](http://www.iowadnr.gov/water/floodplain/contact.html).

**Resources**

- [Iowa’s Threatened and Endangered Species Program](#)
- [U.S. Department of Agriculture, Natural Resources Conservation Service Web Soil Survey](#)
- [FEMA’s national flood information maps](#)
- [Iowa Flood Information System](#)

<b>2-1c</b>	<b>Smart Site Location – Proximity to Services: New Construction</b>
	<b>MANDATORY</b>

**How**

Provide a preliminary location map with your application with exact distances indicating that the project is located within ¼ mile of at least two, or ½ mile of at least four, of the following facilities: Adequate (see definition below) public transportation, supermarket, public school, library, licensed child care center, usable park space, bank, medical or dental office, post office, convenience store, laundry/dry cleaner, pharmacy, place of worship, community or civic center that is accessible to residents.

**Intent**

Locating projects in communities with services strengthens those communities and residents’ ties to society. It also prevents leapfrog development, which carries numerous negative consequences, including fragmented ecosystems, the spread of polluted runoff to new watersheds, strain on

municipal budgets that must stretch to accommodate longer service routes and infrastructure lines, and damage to landscapes that enhance the quality of life for Iowans.

Pedestrian- and transit-oriented neighborhoods inspire smaller streets and less land relegated to the automobile, and create a more livable, efficient community. These neighborhoods offer residents a range of services, parks and employment opportunities within walking and biking distance. They also offer opportunities for a healthier quality of life while lowering residents' dependence on cars, thereby reducing the costs of owning a car and the need for garages and other parking areas.

### Definitions

Adequate transportation means bus stops within ¼ mile of the development. Adequate bus service during peak periods is defined as bus service available every 30 minutes during peak periods.

### Resources

- [Safe Routes to School National Partnership](#)
- [Walkable Communities](#)
- [Walkable and Livable Communities Institute](#)
- [Partners for Livable Communities](#)

<b>2-2a</b>	<b>Compact Development: New Construction</b>
	<b>OPTIONAL</b> Criterion is Only for Projects With a Residential Component (25 points)

### How

The Project architect or designer must complete the density calculation as defined below and certify its correctness. The project applicant must provide documentation from the applicable local jurisdiction indicating that the applicable density requirements provided below are permitted on the project site. The minimum net density for new construction must be:

- 6 units per acre for detached or semi-detached houses;
- 10 for townhomes; and
- 15 for apartments.

Net density is measured by taking the total dwelling units after construction, divided by the acreage of the entire tract down to one decimal point, minus dedicated acreage of public street rights of way, riparian and wetland buffers, and open space that has been dedicated through a conservation program.

### Intent

Compact development encourages more resource-efficient development of land, reduces development costs and conserves energy. It also can contribute to creating more walkable communities, while helping restore, invigorate and sustain livable development patterns.

### Resources

- [Congress for New Urbanism](#)
- [Smart Growth Network](#)
- [Urban Land Institute](#)

<b>2-2b</b>	<b>Compact Development</b>
	<b>OPTIONAL</b> Criterion is Only for Projects With a Residential Component (5 Points maximum for an increase of $\geq$ five units/acre for multifamily buildings, $\geq$ two units/ acre for town homes and $\geq$ 1unit/acre for single-family houses)

**How**

Calculate density as defined under 2-2a, Compact Development, and increase average minimum density for new construction to meet or exceed the following guidelines:

- 7 units per acre for detached or semi-detached
- 12 units per acre for town homes
- 20 units per acre for apartments

**Intent**

Compact development encourages more resource-efficient development of land, reduces development costs and conserves energy. It also can contribute to creating more walkable communities, while helping restore, invigorate and sustain livable development patterns.

**Resources**

- [Congress for New Urbanism](#)
- [Smart Growth Network](#)
- [Urban Land Institute](#)

<b>2-3</b>	<b>Walkable Neighborhoods – Sidewalks and Pathways</b>
	<b>MANDATORY</b>

**How**

Connect the project to the pedestrian grid. Provide a preliminary site map with your application indicating that sidewalks or other all-weather pathways exist or were created to link the development to public spaces, open spaces and adjacent development. Projects whose building entrances open directly on to a public sidewalk meet this requirement.

**Intent**

Making streetscapes safer and more inviting for walkers and bicyclists encourages alternative transportation choices to the automobile. It also promotes physical activity and public health, while creating opportunities for social interaction and increases safety through more eyes on public spaces.

**Resources**

- [Safe Routes to School National Partnership](#)
- [Walkable Communities](#)
- [Walkable and Livable Communities Institute](#)
- [Partners for Livable Communities](#)

2-4	<b>Walkable Neighborhoods – Connections to Surrounding Neighborhood</b>
	<b>OPTIONAL</b> (5 Points)

**How**

Provide a preliminary site map with your application demonstrating at least three separate connections (excluding entrances / exits from a single building) to sidewalks or all-weather pathways in surrounding neighborhoods.

**Intent**

Providing easy access to sidewalks or other all-weather pathways promotes walking, biking and other healthy lifestyles. Walkable neighborhoods reduce dependence on automobile travel.

**Resources**

- [Walk Score](#)
- [Walkable Communities](#)
- [Walkable and Livable Communities Institute](#)
- [Partners for Livable Communities](#)

2-5a	<b>Smart Site Location – Passive Solar Heating/Cooling</b>
	<b>OPTIONAL</b> (7 Points)

**How**

Demonstrate a project with a passive solar design, orientation, and shading that meets the guidelines below. Documentation must include sun angles and a wall section showing compliance with the guidelines and a site plan indicating true north.

Project Type	Potential Points	Requirements
Stand-alone building	7	Meet all guidelines
Projects with multiple buildings	2	25% of the buildings meet all guidelines
	4	50% of the buildings meet all guidelines
	6	75% of the buildings meet all guidelines
	7	100% of the buildings meet all guidelines
Gut rehabilitation or rehabilitation	2	All new windows must comply with the window guidelines
	2	All south-facing elevations must comply with shading guidelines

**Guidelines**

**1. Building orientation**

Elongate the building on an east–west axis with a minimum ratio of width to depth of 2:1 and orient the east–west axis of the building to be within 20 degrees of true east–west.

## 2. Glazing

The glazing area on the south-facing façade should be 30% greater than the sum of the glazing areas on the east-, west-, and north-facing façades.

## 3. Glazing type

Provide windows with U-values of 0.25 and a minimum solar heat gain coefficient (SHGC) of 0.50 by orientation.

## 4. Shading

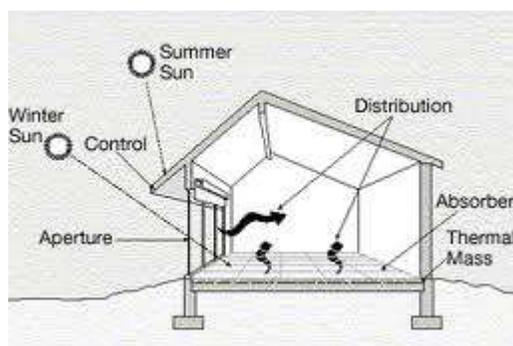
For south-facing windows, at least 50% of the window needs to be shaded by June 21.

### Intent

The utilization of passive solar energy through design minimizes reliance on mechanical heating, lowers the cooling load, and provides more residents with access to daylight.

### Recommendations

- Interior spaces requiring the most lighting, heating, and cooling should be along the south face of the building
- A narrow floor plate (less than 40 feet), single-loaded corridors, and an open floor plan optimize daylight and natural ventilation
- Thermal Massing
  - Locate a material with high thermal mass on the southern portion of the building where sunlight hits during the heating season
  - Materials with thermal mass include brick, concrete, stone, water, and any other material of a similar high density and specific heat capacity
  - The thermal mass location must be shown in the schematic wall section of the southern façades
- Additional Potential Passive Cooling Strategies
  - Plant deciduous shade trees on the south façades
  - Maximize cross ventilation by installing operable windows at the leeward and windward sides of the building



[Five Elements of Passive Solar Design](#)



[Iowa Utilities Board Building Passive Solar Design](#)

### Resources

- [U.S. Department of Energy, "Passive Solar Design"](#)
- [U.S. Department of Energy, "Passive Solar Design for the Home"](#)
- [U.S. Department of Energy- Whole-House Systems Approach](#)

<b>2-5b</b>	<b>Smart Site Location – Grayfield, Brownfield or Adaptive Reuse Site</b>
	<b>OPTIONAL</b> (15 Points)

**How**

Locate the project on a grayfield, brownfield or adaptive reuse site.

**Intent**

Use of previously developed sites reduces pressure on undeveloped land and spread of pavement to new watersheds. Reusing existing structures reduces the need for new materials and utilizes embodied energy.

**Definitions**

- Grayfields are previously developed abandoned sites, such as parking lots, obsolete shopping centers, and dilapidated residential structures scheduled to be deconstructed or demolished
- Brownfields require a Phase II Environmental Site Assessment and remediation plan
- An adaptive reuse site is one that was previously developed for one use and is now proposed for a different use — commercial to residential or residential to commercial — in which at least 25 percent of the proposed development will reuse the existing structure(s)

**Resources**

- [Iowa Brownfield/Grayfield Tax Credit Program](#)
- [Iowa Brownfield Redevelopment Program](#)
- [U.S. Environmental Protection Agency, Brownfields Cleanup and Redevelopment](#)
- [Center for Community Progress](#)
- [Urban Imprint](#)

<b>2-6</b>	<b>Transportation Choices</b>
	<b>OPTIONAL</b> (12 Points)

**How**

Provide a context map demonstrating that the site is within a ¼ mile radius of adequate public transit service (see definition below) qualifies for 12 points. If it can be shown that the site is within ½ mile of adequate public transit service (see definition below), it qualifies for 6 points.

Adequate public transit service during peak periods is defined as 20 or more transit rides per weekday per qualifying transit service.

**Resources**

- [Reconnecting America](#)
- [Victoria Transportation Policy Institute](#)
- [Transportation for America](#)

## Section 3: Site Improvements

3-1

### Environmental Remediation

**MANDATORY**

Except for Scattered-Site, Multiple Single-Family New Construction Projects

#### How

Conduct a Phase I Environmental Site Assessment, a Tier II Environmental Review Assessment per HUD funding requirements, an environmental site assessment approved by HUD through the Part 50 or Part 58 process, or an environmental site assessment approved by USDA through the 1940-G or 1794 process, and any additional assessments required to determine whether any hazardous materials are present on-site.

If an environmental site assessment reveals that mitigation is necessary, perform the appropriate mitigation steps as required.

#### Intent

To help satisfy any site environmental concerns, and to establish liability protections, the first step is known as a Phase I Environmental Site Assessment (ESA). A Phase I ESA takes place prior to purchase and involves research into the site's development history, past uses, and environmental records in and around the site area, in order to determine the likelihood that the site could have been adversely impacted by environmental contaminants.

If you conduct such an "all appropriate inquiry" into the property's past uses and environmental conditions, this can help with establishing liability protections for you under Federal Law as an "innocent landowner" or a "bona fide prospective purchaser".

To qualify for the Federal liability protections, a Phase I ESA must be conducted using ASTM Standard E1527-05. A Phase I that is conducted without following this Standard will not qualify for Federal liability protections. Phase Is are conducted by environmental consulting or engineering firms for a fee. You should ensure that any firm you hire is familiar with the ASTM Standard, and can confidently complete a Phase I review.

#### Conducting a Follow-up Phase II Assessment

When a Phase I indicates that past uses or site conditions may have created the likelihood of an environmental release, it may be beneficial to physically investigate soils and groundwater at the site to determine if contamination is actually present, and to what extent and concentration. An assessment to confirm if contamination is present is known as a Phase II Environmental Site Assessment.

#### Resources

- [Iowa Economic Development Authority Brownfield Site Redevelopment Program](#)
- [Iowa DNR Land Recycling Program](#)
- [EPA Brownfields Program](#)
- [HUD 24 CFR Part 58 Process](#)
- [HUD 24 CFR Part 50 process](#)
- [USDA Environmental Review Process](#)

**How**

All construction that disturbs one acre or more requires a stormwater general permit #2 from the Iowa Department of Natural Resources. Obtain authorization and follow the requirements of the permit including the development and implementation of a Stormwater Pollution Prevention Plan. Submit a copy of the stormwater general permit #2 and the Stormwater Pollution Prevention Plan before site disturbance begins.

For projects disturbing less than one acre, implement EPA's Best Management Practices for erosion and sedimentation control during construction, referring to the EPA document, Stormwater Management for Construction Activities (EPA 832-R-92-005).

Erosion control measures must include all of the following:

- Stockpile and protect disturbed topsoil from erosion (for reuse)
- Control the path and velocity of runoff with silt fencing or comparable measures
- Protect on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures
- Provide swales to divert surface water from hillsides
- If soils in a sloped area (i.e., 25%, or 4:1 slope) are disturbed during construction, use tiers, erosion blankets, compost blankets, filter socks and berms, or some comparable approach to keep soil stabilized
- No compaction inside the drip ring of existing trees and shrubs

**Intent**

Erosion and sediment control during site development keeps soils on site, reduces stormwater runoff and prevents sediment from entering local waterways.

**Resources**

- [Iowa Construction Site Erosion Control Manual](#)
- [Iowa Department of Natural Resources General Permit #2 information](#)
- [Iowa Statewide Urban Design and Specifications \(SUDAS\)](#)
- [Iowa Stormwater Education Program](#)
- [Directory of Certified Professional in Erosion and Sediment Control](#)
- [EPA Erosion and Sediment Control Model Ordinances](#)

**How**

Commit to providing a tree or plant list, to be certified by the Architect or Landscape Architect at Construction Documents stage, that the selection of new trees and plants are at least 50% native species, 100% appropriate to the site's soils and microclimate, and do not include invasive species (see definition below). Limit application of non-native turf species.



[Native Plant Database](#)



[Trees and Water Quality](#)



[Xeriscaping](#)

**Intent**

Native vegetation is well adapted to the climate and provides excellent erosion, sediment, dust and pollution control. Native plants are also more resistant to naturally occurring disease, insects and low levels of nutrients, thereby reducing the need for fertilizers, pesticides or herbicides.

**Definition**

Invasive species are plants that are introduced to an area outside their original range, threaten Iowa's biodiversity and cause harm in their new home.

**Resources**

- [Iowa Stormwater Management Manual Infiltration Practices](#)
- [Iowa Living Roadway Trust Fund Native Plant Database](#)
- [Iowa Prairie Network](#)

## Surface Water Management for Water Quality

**MANDATORY**  
(New Construction)

**Optional (25 points)**  
(Gut Rehabilitation and Rehabilitation)

### How

Utilize green infrastructure practices to infiltrate, evapotranspire, capture and reuse the water quality volume (runoff from up to 1.25" of rain per 24 hours) to maintain or restore natural hydrologies. Green infrastructure practices utilized shall follow the design specifications, if available, in the [Iowa Stormwater Management Manual](#).

Take and email pictures to [greenstreets@iowa.gov](mailto:greenstreets@iowa.gov) of progress and compliance with the surface water management criterion. Medians, where needed, should be seen as opportunities for installing infiltration-based green infrastructure practices. The use of raised medians is discouraged and should be avoided.



[Pervious Pavements](#)



[Biocells/Rain Gardens](#)



[Rain Water Harvesting](#)



[Green Roofs](#)



[Native Vegetation](#)



[Soil Quality Restoration](#)

### Intent

The intent of this criterion is to install green infrastructure infiltration based practices to manage rainfall for water quality above and beyond the local requirements for flood control.

### Recommendations

- Seek out contractors that are certified rainscapers through [Rainscaping Iowa](#) training
- Minimize and disconnect impervious areas (surfaces that do not allow stormwater infiltration), including roofs, driveways, sidewalks and streets, or use porous materials for such areas

### Resources

- [Iowa Stormwater Management Manual](#)
- [Iowa Urban Conservation Program](#)

- [Rainscaping Iowa](#)
- [Iowa Storm Water Education Program](#)
- [Center for Watershed Protection](#)
- [EPA Green Infrastructure.](#)
- [International Stormwater BMP Database](#)
- [Low Impact Development Center](#)

<b>3-5</b>	<b>Storm Drain Labels</b>
	<b>OPTIONAL</b> (2 Points)

**How**

Assure the project plans and specifications call for labeling of all storm drains or storm inlets to clearly indicate where the drain or inlet leads.



[Storm Drain Stenciling Manual](#)

**Intent**

Provide a visual reminder that storm sewer inlets connect to area waterways and groundwater storages, and should not be used to dump garbage of any kind.

**Resources**

- [“Storm Drain Stenciling – How You Can Prevent Water Pollution”](#)
- [School Projects – Storm Drain Stenciling](#)

## Section 4: Water Conservation

4-1

### Water-Conserving Appliances and Fixtures

MANDATORY

#### How

For residential projects, install water-conserving fixtures with the following specifications:

- Toilets – Toilets — 1.28 gpf (gallons per flush) or less, including dual-flush toilets and pressure-assisted toilets (Note: There are both dual-flush and single-flush models of 1.28 GPF toilets available.)
- Urinals – 0.5 gpf or less
- Showerheads – 1.75 gpm (gallons per minute) or less
- Kitchen faucets – 2.0 gpm or less
- Bathroom faucets – 1.5 gpm or less

For non-residential projects install water-conserving fixtures with the following specifications:

- Toilets (water closets) – 1.6 gpf (gallons per flush) or less
- Urinals – .5 gpf
- Public Laboratories – .5 gpm or less at 60 psi
- Showerheads – 1.75 gpm (gallons per minute) or less
- Kitchen faucets – 2.0 gpm or less



[WaterSense Fixtures](#)



[Rain Water Harvesting](#)

#### Intent

Showers and faucets account for approximately 25 percent of indoor water use. Toilets account for approximately 20 percent of indoor water use. Saving water translates into utility savings, both by conserving water and reducing the energy required for water heating.

#### Resources

- [EPA's WaterSense®](#)

4-2	<b>No Irrigation</b>
	<b>MANDATORY</b>

**How**

Do not install irrigation. Watering tubes for trees are allowed for a grace period of two years. Irrigation systems already in existence onsite are grandfathered in. The use of captured rainwater for grandfathered in irrigation systems is encouraged.

**Intent**

On average, outdoor water use accounts for about 40 percent of residential water use. Native landscapes or carefully selected plantings can tolerate no irrigation once established, even in dry periods.

**Resources**

- [American Society of Landscape Architects](#)
- [Water-Smart Landscapes](#)
- [Water Wiser: The Water Efficiency Clearinghouse](#)

4-3	<b>Water Reuse</b>
	<b>OPTIONAL</b> (10 Points)

**How**

Harvest, treat, and reuse rainwater and/or greywater to meet a portion of the project’s water needs.

To achieve optional points, provide the defined percentage of the project’s total water needs through rainwater and /or greywater (using either one or a combination of both strategies).

Total water needs include all exterior and interior water use.

TOTAL WATER NEEDS SUPPLIED BY RAINWATER AND/OR GREYWATER	NUMBER OF OPTIONAL POINTS
10%	2 points
20%	4 points
30%	6 points
40%	8 points
≥ 50%	10 points



[Rain Water Harvesting](#)



[Water Reuse – AWWA](#)



[Living Building Challenge](#)

### **Intent**

Rainwater and greywater reuse strategies reduce the need for municipal water supplies and sewage treatment.

### **Recommendations**

- Seek out contractors successfully completing [Rainscaping Iowa](#) training
- Rainwater can be harvested from impervious surfaces such as roofs and carried via gutters and downspouts to a storage tank or cistern where it can be treated or filtered for potable uses. Untreated rainwater may be used for non-potable uses.
- Greywater may be stored and treated for non-potable uses such as toilet flushing and irrigation

### **Resources**

- [American Water Works Association](#)
- [Living Building Challenge](#)
- [American Rainwater Catchment Systems Association](#)

## Section 5: Energy Efficiency

All residential and mixed-use projects must have an HVAC System Adjustment & Verified Efficiency (SAVE) trained and certified and RESNET certified third-party Home Energy Rating System (HERS) Rater on the Project team.

The following testing protocols will be followed:

- HVAC (SAVE) program or installed efficiency testing standard System Efficiency Ratio (SER) test of the National Comfort Institute (NCI).
- RESNET Mortgage Industry Standards

The HERS Rater must verify energy efficiency achievement by meeting the performance levels set forth by this program, (unless otherwise noted.)

A minimum HERS Index of 70 must be achieved on each dwelling unit. The project team must submit the HERS Rating Certificate, Code Certificate and SAVE score to the Iowa Economic Development Authority, (unless otherwise noted.)

### Air Sealing Key Points

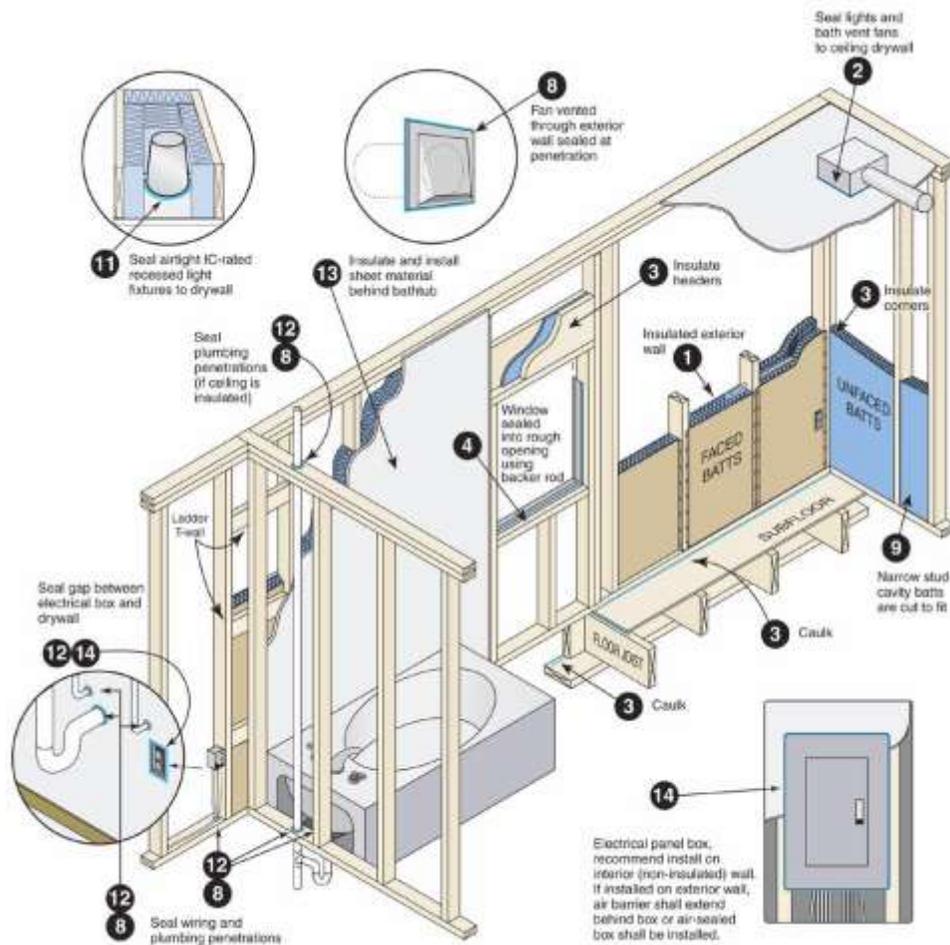


Image courtesy of Southface

Disclaimer: This document is intended solely to help graphically demonstrate the air leakage provisions of section 402.4 of the 2012 IECC. It does not cover all air sealing locations or techniques. Other code provisions may be applicable as well.

## Air Barrier and Insulation Inspection Component Guide

Component	Criteria
Air barrier and thermal barrier	<b>Exterior</b> thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier
	Breaks or joints in the air barrier are filled or repaired
	Air-permeable insulation is not used as a sealing material
	Air-permeable insulation is inside of an air barrier
Ceiling/attic	Air barrier in any dropped ceiling / soffit is substantially aligned with insulation and any gaps are sealed
	Attic access (except unvented attic), knee-wall door, or drop-down stair is insulated and sealed
Walls	Corners and headers are insulated; junction of foundation and sill plate is sealed
Windows and doors	Space between window / door jambs and framing is sealed – No stuffing of fiberglass insulation is allowed
Rim joists	Rim joists are insulated and include an air barrier on the interior of the insulation
Floors (including above-garage cantilevered floors)	Insulation is installed to maintain permanent contact with underside of and subfloor decking – cavity is completely filled.
	Air barrier is installed at any exposed edge of insulation
Crawl space walls	Insulation is permanently attached to walls
	Exposed earth in unvented crawl spaces is covered with Class I vapor barrier with overlapping joints taped
Shafts, penetrations	Duct shafts, utility penetrations, knee walls, and flue shafts opening to exterior or unconditioned spaces are sealed
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled with sprayed / blown insulation
Garage separation	Air sealing is provided between the garage and conditioned spaces
Recessed lighting	Recessed light fixtures are airtight, ICAT rated, & sealed to drywall
	Exception — fixtures in conditioned space
Plumbing and wiring	Insulation is placed between the exterior wall and the pipes
	Batt insulation is cut to fit around wiring and plumbing, or sprayed / blown insulation extends behind piping and wiring
Shower / tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall
Electrical / phone box	Air barrier extends behind boxes or air-sealed-type boxes are installed on exterior walls
Common wall	Air barrier is installed in common wall between dwelling units
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall
Fireplace	Fireplace walls include an air barrier

## Building Performance Standard: New Construction and Gut Rehabilitation: Single-Family and Multifamily Buildings ≤ 3 Stories

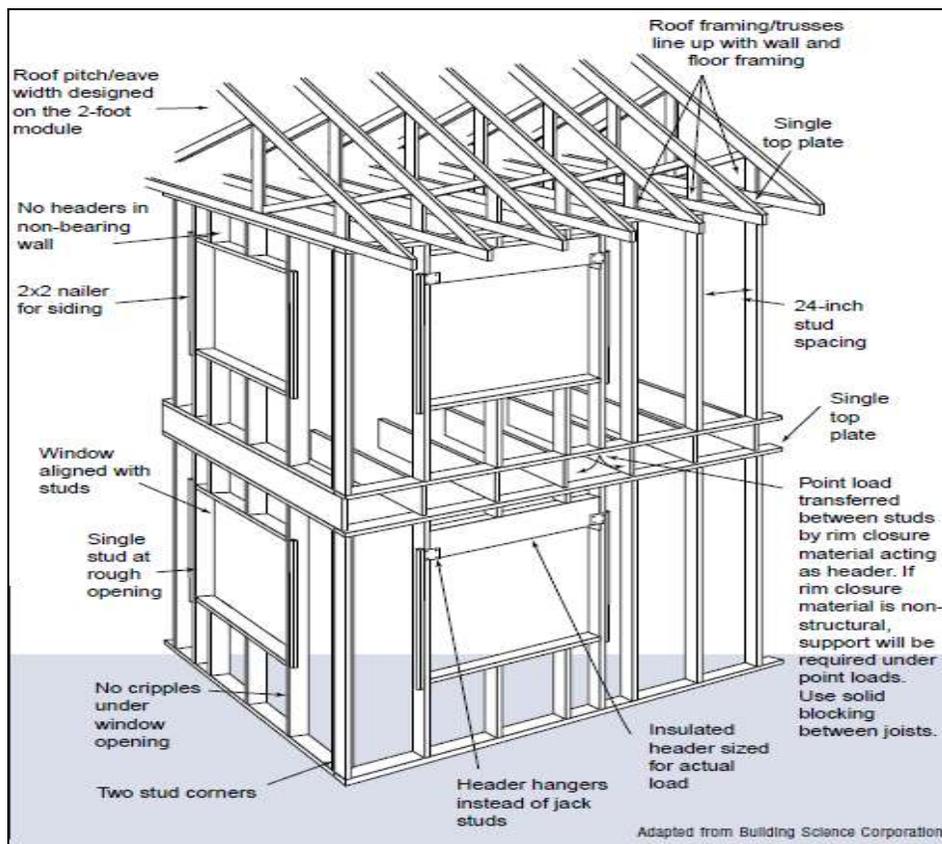
MANDATORY

### How

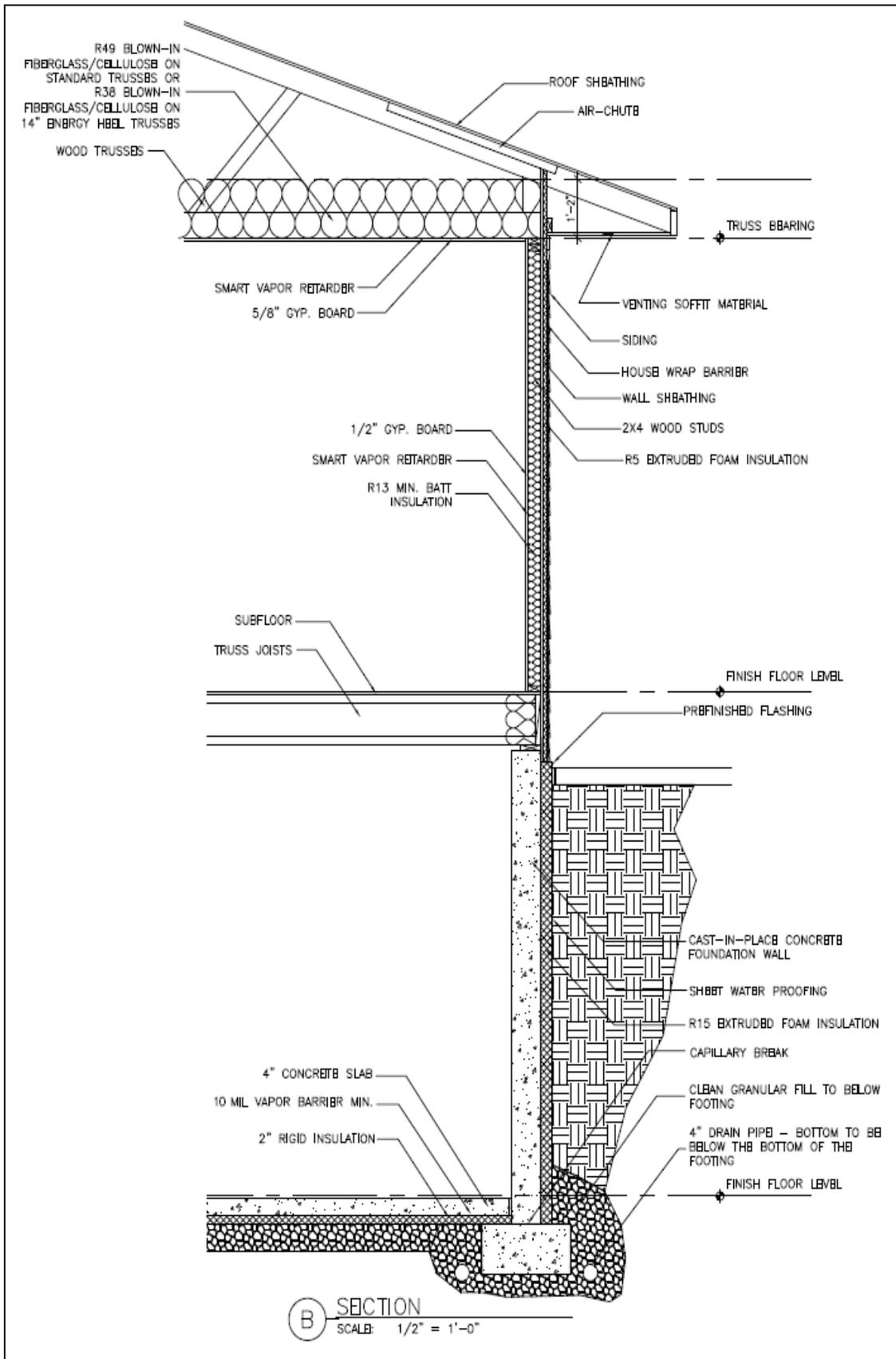
A (SAVE) trained and certified and RESNET certified third-party (HERS) Rater must verify energy efficiency achievement by meeting the performance levels identified in the Energy Performance Table below. **A minimum HERS Index of 70 and 85% total SAVE system performance must be achieved.** Use IEDA provided scope of work template when issuing request for proposals for HERS Rater.

During the design phase, work with a qualified Iowa HVAC (SAVE) trained and certified HVAC contractor and RESNET certified Home Energy Rater and (SAVE) certified testing organization to set energy efficiency goals that comply with the performance levels above. After the project team has decided on an “energy package,” incorporate the finalized building performance thresholds and measures into the project plans and specs and or scope of work. Solicit an experienced HERS Rater to create and implement a verification plan during the construction processes, and conduct building performance inspections, post-construction testing and final reporting.

Take and email pictures to [greenstreets@iowa.gov](mailto:greenstreets@iowa.gov) during progress and compliance with basement floor/slab insulation, capillary break on footing, advanced framing, exterior rigid insulation, air sealing, and duct sealing. Utilize best practices such as pictured below to achieve building high performance.



[Advanced Framing](#)



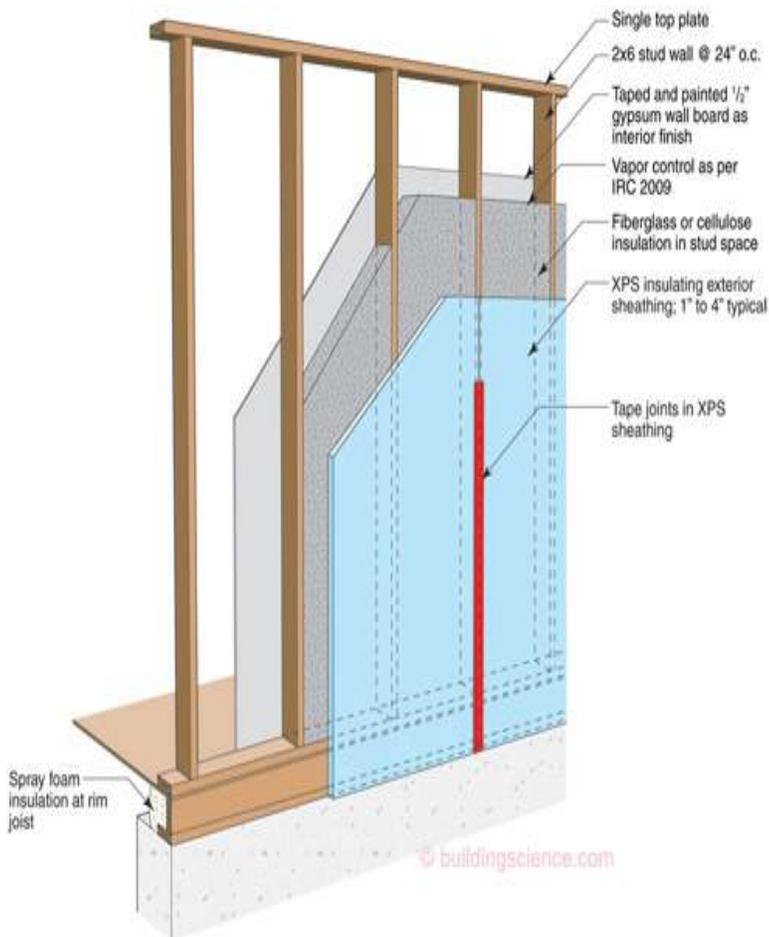
[Model Wall Assembly](#)



[Insulating Sheathing](#)



[HVAC SAVE](#)



[High R-Value Wall](#)

## Energy Performance Table

Item	Minimum Required
<b>Cooling</b>	Proper Sizing (Manual J & D Required)
Electric, Forced-air, central air conditioners	14.5 SEER
Electric, Forced-air, air-source heat pumps	14.5 SEER
Electric, ground-source heat pumps (closed loop)	14.1EER
Electric, ground-source heat pumps (open loop)	16.2 EER
<b>Heating</b>	Proper Sizing (Manual J & D Required)
Natural gas, forced-air furnaces	92 AFUE
Natural gas, boilers	90 AFUE
Electric, Forced-air, air-source heat pumps	8.5 HSPF
Electric, ground-source heat pumps (closed loop)	3.3 COP
Electric, ground-source heat pumps (open loop)	3.6 COP
Ground-source heat pumps and boilers piping insulation	Insulated to a minimum of R-3
HVAC System Performance	85% - SAVE – Total system performance. Projects utilizing exposed duct work or boiler systems use SAVE equipment performance testing protocol instead.
Thermostat	Programmable – Setback with 2 or more temperature settings – down to min. of 55° & up to 85° for each HVAC System *Not applicable on Heat Pumps
Ductwork – Sheet metal ducts (supply & return) and joints – insulated to R-8 in unconditioned spaces / sealing each joint using mastic and/or UL 181 approved tapes or sealants	4% or less tested duct leakage to unconditioned spaces
Thermal Envelope	The project must pass a thermal bypass inspection checklist performed by a third-party Energy Rater certified by RESNET or Building Performance Institute. The following must be sealed & or blocked with an air barrier: All joints, seams & penetrations / windows, doors & skylights / openings between window & door assemblies & jambs & framing / utility penetrations / dropped ceiling or chases adjacent to the thermal envelope / knee walls / walls & ceilings between units / attic access openings / rim joist junction / other sources of infiltration (must use rigid blocking). Infiltration levels must be equal to or less than 4 ACH50 determined by using a blower door test.
<b>Insulation</b>	
Ceiling	R-49 – Raised Heel Truss with minimum 14” heel height
Wood Frame Wall	Zone 5 & 6 = Minimum of R-13 cavity + R-5 continuous rigid exterior foam
Mass Frame Wall	Zone 5 = R-13/17, Zone 6 = R-15/20
Floor, above unheated space	Minimum R-30 (must fill cavity depth)
Basement Wall (entire)	Zone 5 & 6 = R-15/19
Rim Joist	R-19 + 5 continuous rigid exterior foam

Slab	R-10 next to slab edge – down to footing on walk-outs and under slab minimum of R-10 4' back and minimum of R-5 rest of slab. Slab insulation to be verified by third-party Energy Rater.
Crawl Space	R-15 continuous / R-19 cavity (must be conditioned / floor minimum 10 mil poly)
Thermally Isolated Sunrooms	Min. R-24 in ceilings / min. R-13 in side walls
Windows ENERGY STAR (must have NFRC sticker for residential windows)	0.30 U-factor
Doors	R-5
Water Heaters	Natural gas must be power vented
Natural gas, up to 60 gallons	.67 EF
Natural gas, 60-80 gallons	.85 TE
Natural gas tankless	.80 EF
Natural gas condensing	90% TE
Electric	.93 EF (40 gallons)
Circulation hot water systems	Hot water piping shall be insulated to a minimum of R-3 & have an automatic manual switch to turn off the pump when the system is not in use
Mechanical Ventilation	Required to be balanced and tested to meet ASHRAE 62.2
Lighting	
Recessed Lighting	Shall be sealed & ICAT-rated & labeled to meet ASTM E 283 & gasketed
High-efficiency lamps	A minimum of 75% of energy efficient lighting is installed (i.e. CFLs, LEDs) – interior lighting
Attic Doors & Hatches (from conditioned to unconditioned spaces)	Gasketed / barrier of a minimum of 18" tall / minimum of R-20 rigid foam on scuttle top
Fireplaces	Wood-burning fireplaces shall have gasketed doors & outdoor combustion air / insulated / blocked & sealed
	Minimum HERS Index = 70

Projects greater than 100,000 cubic feet of heated or cooled interior space must complete the Iowa required [Energy Review Form](#) identified in Code of Iowa chapter 103A.19(6)

### Sampling Protocol

To insure quality design and installation of HVAC systems and overall performance of each unit while maintaining overall project affordability, the following sampling protocol has been established.

The below stated sampling protocol is based on a per building basis not a total project basis. Buildings with 12 or fewer units must pass an Iowa HVAC (SAVE) program testing protocol or installed efficiency testing standard (SER) test of (NCI) and a HERS Index for all units.

Buildings with more than 12 units must pass an Iowa SAVE program testing protocol or SER test of the (NCI) and the required HERS Index for at least 12 units. The third-party energy rating firm shall select the sample units to be tested and shall consider and use unit floor plan and location when selecting sample test units. Units included in the sample set must be a variety of unit types, direction and location in the building. Examples: Exterior & Interior, first floor, second floor, third floor.

If one of the units in the sample set fails to pass the SAVE test or achieve the mandatory HERS Index, corrections shall be made and four additional units tested. If one or more of the additional units fails to pass the SAVE test or achieve the mandatory HERS Index, seven additional units shall be tested. If failures still occur in this sample set the sampling option for the project will be forgone and all units must be tested and shall pass the mandatory criteria.

*\*Thermal inspections cannot be sampled. Every unit must receive an inspection to ensure the thermal enclosure, air barrier and insulation criteria have been achieved. This is to be verified by the third-party energy rating firm.*

### **Intent**

High-performance homes achieve energy savings in heating, cooling, water heating, lighting, and appliance efficiencies, which improve resident comfort, reduce operating costs, and decrease greenhouse gas emissions.

### **Resources**

- [HVAC System Adjustment and Verified Efficiency \(SAVE\)](#)
- [U.S. Department of Energy, Air Sealing, Technology Fact Sheet](#)
- [Advanced Building Core Performance Guide](#)
- [Use Optimum Value Engineering \(Advanced Framing\)](#)
- [PATH: “Advanced Framing Techniques: Optimum Value Engineering”](#)
- [APA – The Engineered Wood Association](#)
- [Residential Energy Services Network \(RESNET\)](#)

## Building Performance Standard: New Construction and Gut Rehabilitation: Multifamily Buildings $\geq$ 4 Stories

MANDATORY

### How

Use an HVAC (SAVE) trained and certified and RESNET certified, third-party (HERS) Rater with the ability to serve larger projects and expertise in high performance mechanical systems to provide design assistance and energy modeling services and verify energy efficiency achievement meeting or exceeding the performance levels identified below. 5-1b does not have to maintain a HERS score of 70 or lower. Use IEDA provided scope of work template when issuing request for proposals for HERS Rater.

Take and email pictures to [greenstreets@iowa.gov](mailto:greenstreets@iowa.gov) during progress and compliance with basement floor/slab insulation, capillary break on footing, advanced framing, exterior rigid insulation, air sealing, and duct sealing.

- Exceed the performance of ASHRAE 90.1-2010 Appendix G by 15 percent.
- Pass a slab insulation and pre-drywall thermal bypass inspection by a trained and certified third-party RESNET Energy Rater to verify proper sealing and insulation practices per the Energy Performance Table in **Criterion 5-1a** on pages 37-38.
- Use a RESNET certified third-party Energy Rater to document that the HVAC system was installed correctly for each unit by measuring and documenting that actual BTU delivery is 85% or greater of the total system's rated output capacity. Use the Iowa HVAC (SAVE) program testing protocol or installed efficiency testing (SER) of (NCI).
- For all equipment installed, meet or exceed the minimum performance requirements in the Energy Performance Table in **Criterion 5-1a** on pages 37-38.
- For insulation values, meet or exceed the values in **Criterion 5-1a** on pages 37-38 including the continuous exterior foam insulation to achieve a thermal break.
- Submit completed reports to the Iowa Economic Development Authority, including the following: energy modeling information showing adherence to exceeding ASHRAE 90.1-2010 Appendix G by 15 percent, code certificate, SAVE scores, and thermal bypass checklist.
- Projects greater than 100,000 cubic feet of heated or cooled interior space must complete the Iowa required [Energy Review Form](#) identified in Code of Iowa chapter 103A.19(6)

### Intent

High-performance buildings achieve energy savings in heating, cooling, hot water, lighting, and appliance efficiencies, which improve resident comfort and reduce operating costs.

### Resources

- [HVAC System Adjustment and Verified Efficiency \(SAVE\)](#)
- [ENERGY STAR Certified Multifamily High Rise Buildings](#)
- [U.S. Department of Energy, Air Sealing, Technology Fact Sheet](#)
- [Use Optimum Value Engineering \(Advanced Framing\)](#)
- [PATH: "Advanced Framing Techniques: Optimum Value Engineering"](#)
- [Residential Energy Services Network \(RESNET\)](#)

**How**

Use a (SAVE) trained and certified and RESNET certified, third-party (HERS) Rater with the ability to serve larger projects or mechanical engineer to design for and verify energy efficiency achievement meeting or exceeding the performance levels identified below. Use IEDA provided scope of work template when issuing request for proposals for HERS Rater.

- Exceed the performance of ASHRAE 90.1-2010 Appendix G by 15 percent for the entire building.
- For residential units, follow the energy performance standards in the Energy Performance Table in **Criterion 5-1a** on pages 37-38.
- For insulation values, all project types shall meet or exceed the values in **Criterion 5-1a** on pages 40-41 including the continuous exterior foam insulation to achieve a thermal break.
- Pass a slab insulation and pre-drywall thermal bypass inspection by a trained and certified third-party RESNET Energy Rater to verify proper sealing and insulation practices per the Energy Performance Table in **Criterion 5-1a** on pages 37-38.
- Use a RESNET certified third-party Energy Rater to document that the HVAC system was installed correctly for each unit by measuring and documenting that actual BTU delivery is 85% or greater of the total system's rated output capacity. Use the Iowa HVAC (SAVE) program testing protocol or installed efficiency testing standard (SER) of the (NCI).
- Submit completed to the Iowa Economic Development Authority, energy modeling information showing adherence to exceeding ASHRAE 90.1-2010 Appendix G by  $\geq$  15 percent, code certificate, HERS Rating Certificates, thermal bypass checklist, SAVE scores and reports
- Projects greater than 100,000 cubic feet of heated or cooled interior space must complete the Iowa required [Energy Review Form](#) identified in Code of Iowa chapter 103A.19(6)

Take and email pictures to [greenstreets@iowa.gov](mailto:greenstreets@iowa.gov) during progress and compliance with basement floor/slab insulation, capillary break on footing, advanced framing, exterior rigid insulation, air sealing, and duct sealing.

**Intent**

High-performance buildings achieve energy savings in heating, cooling, hot water, lighting, and appliance efficiencies, which improve occupant comfort, and reduce operating costs.

**Resources**

- [HVAC System Adjustment and Verified Efficiency \(SAVE\)](#)
- [U.S. Department of Energy, Air Sealing, Technology Fact Sheet](#)
- [Advanced Building Core Performance Guide](#)
- [Use Optimum Value Engineering \(Advanced Framing\)](#)
- [PATH: "Advanced Framing Techniques: Optimum Value Engineering"](#)
- [Residential Energy Services Network \(RESNET\)](#)

**How**

- Exceed the performance of ASHRAE 90.1-2010 Appendix G by 15 percent
- Utilize a trained commissioning agent, hired by the project owner, to commission the building following the commissioning scope of work in Appendix A of [The Building Commissioning Guide](#) by the General Services Administration
- For insulation values, all project types shall meet or exceed the values in **Criterion 5-1a** on pages 37-38 including the continuous exterior foam insulation to achieve a thermal break
- Pass a slab insulation and pre-drywall thermal bypass inspection by a trained and certified third-party RESNET Energy Rater to verify proper sealing and insulation practices per the Energy Performance Table in **Criterion 5-1a** on pages 37-38
- Use IEDA provided scope of work template when issuing request for proposals for HERS Rater
- Submit completed to the Iowa Economic Development Authority, energy modeling information showing adherence to exceeding ASHRAE 90.1-2010 Appendix G by  $\geq 15$  percent, code certificate and thermal bypass checklist
- Projects greater than 100,000 cubic feet of heated or cooled interior space must complete the Iowa required [Energy Review Form](#) identified in Code of Iowa chapter 103A.19(6)

Take and email pictures to [greenstreets@iowa.gov](mailto:greenstreets@iowa.gov) during progress and compliance with basement floor/slab insulation, capillary break on footing, advanced framing, exterior rigid insulation, air sealing, and duct sealing.

**Resources**

- [HVAC System Adjustment and Verified Efficiency \(SAVE\)](#)
- [U.S. Department of Energy, Air Sealing, Technology Fact Sheet:](#)
- [Advanced Building Core Performance Guide](#)
- [Use Optimum Value Engineering \(Advanced Framing\)](#)
- [PATH: "Advanced Framing Techniques: Optimum Value Engineering"](#)
- [Residential Energy Services Network \(RESNET\)](#)

## Building Performance Standard: Rehabilitation: Single-Family and Multifamily Buildings ≤ 3 Stories

MANDATORY

### How

- Achieve a HERS Index of 85 or better and a SAVE total system performance of 85% or better.
- To demonstrate energy performance equivalent to a HERS Index 85 and SAVE system performance of 85% or better, contract with an HVAC SAVE trained and certified and RESNET certified third-party HERS Rater who will be responsible for the following. Use IEDA provided scope of work template when issuing request for proposals for HERS Rater.
  - Creating an energy model (RESNET accredited software) to the building plans and specifications to show the building's projected energy performance in the design stage.
  - Completing a mid-construction pre-drywall thermal enclosure inspection to verify the thermal envelope meets the requirements in the Energy Performance Table in **Criterion 5-1a** on pages 37-38
  - Verifying the final performance of the building with post-construction performance testing, including a blower door and duct blaster test of the home and /or units
  - Verify the HERS Rating & an HVAC SAVE system performance score or 85% or better
- If natural drafting equipment is not being replaced with high efficiency equipment, a combustion safety test shall be performed to BPI or RESNET standards
- Conduct thermal imaging of the entire building and prepare a report providing air infiltration and insulation opportunities.
- Any method or strategy (except for electric-generating renewable energy systems) can be implemented to satisfy the targeted minimum energy performance
- If rehabilitating a multifamily low-rise building, generate a HERS certificate for each unique floorplan within the project or subdivision
- For all equipment installed, meet or exceed the minimum performance requirements in the Energy Performance Table in **Criterion 5-1a** on pages 37-38
- If stripping the building exterior to the exterior sheathing install at least an R-5 of continuous exterior foam insulation to achieve a thermal break
- Submit completed to the Iowa Economic Development Authority, energy modeling information, code certificate, HERS Rating Certificates, thermal bypass checklist, SAVE scores and reports
- Projects greater than 100,000 cubic feet of heated or cooled interior space must complete the Iowa required [Energy Review Form](#) identified in Code of Iowa chapter 103A.19(6)

Take and email pictures to [greenstreets@iowa.gov](mailto:greenstreets@iowa.gov) during progress and compliance with basement floor/slab insulation (if applicable), capillary break on footing (if applicable), advanced framing, exterior rigid insulation (if applicable), air sealing, and duct sealing.

### Intent

A HERS Index of 85 will achieve approximately 2009 International Energy Conservation Code (IECC) energy performance levels in heating, cooling, hot water, lighting, and appliance efficiencies.

### Resources

- [RESNET Certified Energy Raters](#)
- [U.S. Department of Energy, Air Sealing, Technology Fact Sheet](#)
- [Residential Energy Services Network \(RESNET\)](#)

### How

Demonstrate energy performance for the completed project equivalent to ASHRAE 90.1-2010. This performance requirement can only be met through building performance improvements and not through the addition of electric-generating renewable energy systems. Contract with an experienced multifamily rehabilitation team for design assistance and to:

- Create an energy model with the building plans and specifications to show the building's projected ASHRAE 90.1-2010 energy performance in the design stages
- If natural drafting equipment is not being replaced with high efficiency equipment, a combustion safety test shall be performed to BPI or RESNET standards
- Conduct thermal imaging of the entire building and prepare a report providing air infiltration and insulation opportunities
- Pass a mid-construction pre-drywall thermal enclosure inspection by a trained and certified third-party RESNET Energy Rater to verify adherence to thermal envelope requirements in the Energy Performance Table in **Criterion 5-1a** on pages 37-38. Use IEDA provided scope of work template when issuing request for proposals for HERS Rater.
- Verify that if the building exterior was stripped down to the exterior sheathing that at least an R-5 of continuous exterior rigid foam insulation has been installed to achieve a thermal break
- Conduct total SAVE System Performance tests documenting a total SAVE performance level of 85 percent or better. Projects utilizing exposed duct work or boiler systems can perform a SAVE Equipment Performance test in lieu of the SAVE System Performance test.
- Verify all equipment installed, meets or exceeds the minimum performance requirements in the Energy Performance Table in Criterion 5-1a on pages 37-38
- Submit completed to the Iowa Economic Development Authority, energy modeling information, code certificate, thermal bypass checklist, SAVE scores and reports
- Projects greater than 100,000 cubic feet of heated or cooled interior space must complete the Iowa required [Energy Review Form](#) identified in Code of Iowa chapter 103A.19(6)

Take and email pictures to [greenstreets@iowa.gov](mailto:greenstreets@iowa.gov) during progress and compliance with basement floor/slab insulation (if applicable), capillary break on footing (if applicable), advanced framing, exterior rigid insulation (if applicable), air sealing, and duct sealing.

### Intent

Buildings rehabilitated to ASHRAE 90.1-2010 energy performance levels achieve energy savings in heating, cooling, water heating, lighting, and appliance efficiencies, which improve resident comfort, lower operating costs, and decrease greenhouse gas emissions

### Resources

- [U.S. Department of Energy, Air Sealing, Technology Fact Sheet](#)
- [ASHRAE](#)
- [Residential Energy Services Network \(RESNET\)](#)

**How**

Demonstrate energy performance for the completed project equivalent to ASHRAE 90.1-2010. This performance requirement can only be met through building performance improvements and not through the addition of electric-generating renewable energy systems. Contract with an experienced commercial building rehabilitation team for design assistance and to:

- Create an energy model with the building plans and specifications to show the building's projected ASHRAE 90.1-2010 energy performance in the design stages
- If natural drafting equipment is not being replaced with high efficiency equipment, a combustion safety test shall be performed to BPI or RESNET standards
- Conduct thermal imaging of the entire building and prepare a report providing air infiltration and insulation opportunities
- Pass a mid-construction pre-drywall thermal enclosure inspection by a trained and certified third-party RESNET Energy Rater to verify adherence to thermal envelope requirements in the Energy Performance Table in **Criterion 5-1a** on pages 37-38. Use IEDA provided scope of work template when issuing request for proposals for HERS Rater.
- Verify that if the building exterior was stripped down to the exterior sheathing that at least an R-5 of continuous exterior rigid foam insulation has been installed to achieve a thermal break
- Conduct total SAVE System Performance tests if applicable based on building size and HVAC system installed. Verify a total SAVE performance level of 85 percent or better. Projects utilizing exposed duct work or boiler systems can perform a SAVE Equipment Performance test in lieu of the SAVE System Performance test. Verify all equipment installed, meets or exceeds the minimum performance requirements in Energy Performance Table, Criterion 5-1a on pages 37-38
- Verify the building's energy performance meets or exceeds ASHRAE 90.1-2010
- Submit completed to the Iowa Economic Development Authority, energy modeling information, code certificate, thermal bypass checklist, SAVE scores and reports
- Projects greater than 100,000 cubic feet of heated or cooled interior space must complete the Iowa required [Energy Review Form](#) identified in Code of Iowa chapter 103A.19(6)

Take and email pictures to [greenstreets@iowa.gov](mailto:greenstreets@iowa.gov) during progress and compliance with basement floor/slab insulation (if applicable), capillary break on footing (if applicable), advanced framing, exterior rigid insulation (if applicable), air sealing, and duct sealing.

**Intent**

Buildings rehabilitated to ASHRAE 90.1-2010 energy performance levels achieve energy savings in heating, cooling, water heating, lighting, and appliance efficiencies, which improve resident comfort, lower operating costs, and decrease greenhouse gas emissions

**Resources**

- [U.S. Department of Energy, Air Sealing, Technology Fact Sheet](#)
- [ASHRAE](#)
- [Residential Energy Services Network \(RESNET\)](#)

5-2

## ENERGY STAR and Energy Efficient Appliances

**MANDATORY**  
If Providing Appliances

### How

If providing appliances, install ENERGY STAR labeled refrigerators, dishwashers and washers. Specify clothes dryers with built-in moisture sensors.

When the energy performance of the home is modeled to produce a HERS Index for 5-1a, 5-1c, or 5-1d, the model should include the appliances and the HERS Index should reflect this.

If not providing appliances, provide information on purchasing ENERGY STAR appliances in the occupant manual required in section 8.2.

### Resources

- [ENERGY STAR](#)

5-3a

## Efficient Lighting: Interior

**MANDATORY**

### How

Design and construct the project to meet the following interior lighting specifications for residential and non-residential projects.

#### For residential projects:

Integrate proper use of daylighting into building designs. Install a minimum of 75 percent energy efficient lighting including LEDs and compact fluorescents. Use ENERGY STAR or high-efficiency commercial grade fixtures in all common areas and outdoors.

If reusing existing fixtures in a rehab, installing compact fluorescent light bulbs (CFLs) or other products that achieve equal to or better energy performance is permitted. If installing new fixtures, these must be ENERGY STAR labeled.

The following lighting types are exempt from this requirement: emergency lighting; lighting required by code for health and safety purposes; and lighting used for eye adaptation near covered vehicle entrances and exits.

#### For non-residential projects:

Meet or exceed current ASHRAE standard 90.1-2010 for interior lighting or follow applicable interior lighting guidelines from the [ASHRAE Advanced Energy Design Guides](#).

### Resources

- [ENERGY STAR Advanced Lighting Package](#)

**How****Common Area Lighting****New Construction and Gut Rehabilitation**

Use ENERGY STAR–labeled fixtures, LEDs, T8 fixtures with electronic ballasts or better, or any equivalent high-performance lighting fixtures and bulbs in all common areas. Non-apartment spaces, except those intended for 24-hour operation, or where automatic shutoff would endanger the safety of the occupants, must have occupancy sensors or automatic bi-level lighting controls.

**Rehabilitation**

If being replaced, new common space and emergency lighting fixtures must be ENERGY STAR–labeled fixtures, LEDs, T8 fixtures with electronic ballasts or better, or any equivalent high-performance lighting fixtures and bulbs. If reusing existing fixtures in a rehab, projects must install screw-in compact fluorescent light bulbs (CFLs) where applicable.

**Emergency Lighting**

If installing new or replacing, all exit signs shall meet or exceed LED efficiency levels and conform to local building codes; fixtures located above stairwell doors and other forms of egress shall contain a battery backup feature. Photoluminescent exit signs may be used as an alternative to LED signs only if all local code requirements are satisfied.

**Resources**

- [ENERGY STAR Advanced Lighting Package](#)

**How****New Construction — Single-Family and Multifamily Buildings** (three stories or fewer):

Install ENERGY STAR qualified fixtures or LEDs with a minimum efficacy of 45 lumens / watt, equipped with daylight sensors on all outdoor lighting, including front and rear porch lights.

- Fixtures should include automatic switching on timers or photocell controls for all lighting not intended for 24-hour operation or required for security
- All fixtures must be full cut-off fixtures that shield light pollution from the night sky

**New Construction — Multifamily Buildings** (four stories or more) **and Commercial:**

80% of outdoor lighting fixtures must be ENERGY STAR–qualified or have ENERGY STAR–qualified lamps installed. Fixtures must include automatic switches on timers or photocell controls except fixtures intended for 24-hour operation, required for security or located on apartment balconies.

**Rehabilitation — All Buildings:**

If being replaced, install ENERGY STAR CFLs or LEDs with a minimum efficacy of 45 lumens/watt equipped with daylight sensors on all outdoor lighting, including front and rear porch lights.

- Fixtures should include automatic switching on timers or photocell controls for all lighting not intended for 24-hour operation or required for security
- All fixtures must be full cut-off fixtures that shield light pollution from the night sky

## Recommendations

Design outdoor lighting to eliminate light trespass from project site and minimize impact on dark skies.

## Resources

- [ENERGY STAR Advanced Lighting Package](#)
- [IES of North America's Recommended Practice Manual: Lighting for Exterior Environments](#)
- [Full Cut-off Dark Sky Approved Fixtures](#)

5-4	<b>HVAC Sizing and Installation and Duct Systems</b>
<b>MANDATORY</b>	

## How

Size HVAC equipment to prevent short-cycling of heating or air conditioning and ensure adequate dehumidification. Size residential heating and cooling equipment in accordance with the Air Conditioning Contractors of America Manual, Parts D, J and S, ASHRAE handbooks, or equivalent software. Seal all ductwork with mastic or an approved UL 181 listed sealants. Insulating all supply ducts is recommended.

## Intent

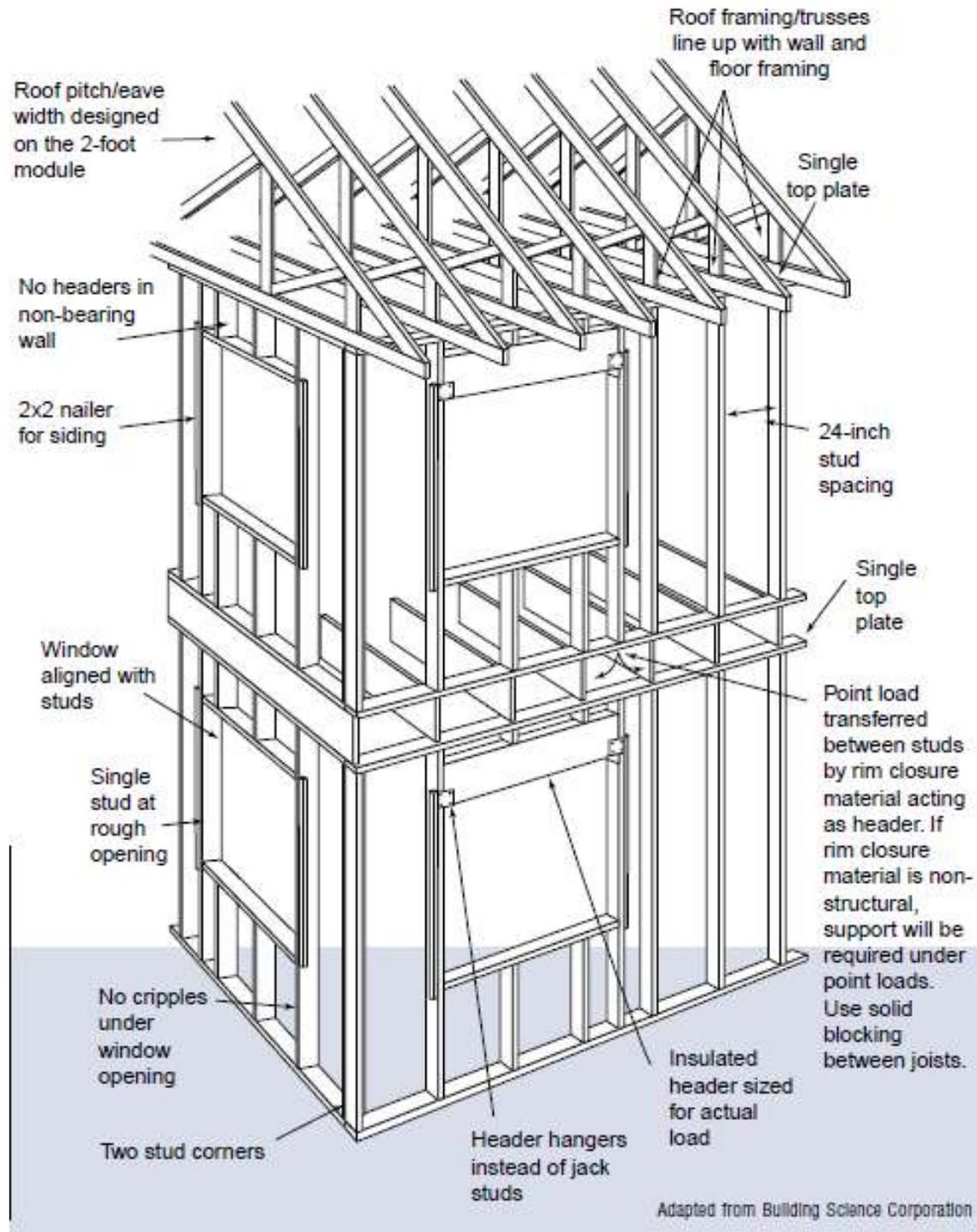
Appropriately sized equipment can improve efficiency and ensure adequate dehumidification, preventing short-cycling that can lead to excess moisture in the air and resident discomfort.

## Resources

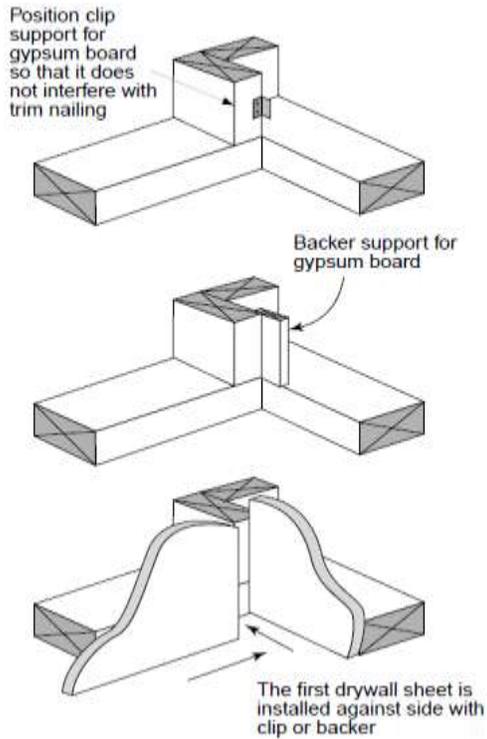
- [The HVAC System Adjustment & Verified Efficiency \(SAVE\) Iowa](#)
- [Air Conditioning Contractors of America, Manual D: Residential Duct Design Checklist](#)
- [Air Conditioning Contractors of America, information on Manuals D, J and S](#)
- [Air Conditioning Contractors of America, HVAC Quality Installation Specification](#)

**How**

- Follow Optimum Value Engineering best practices for all framing where possible
- Use truss uplift clips when installing trusses and do not attach ceiling drywall near corners.

[Advanced Framing](#)

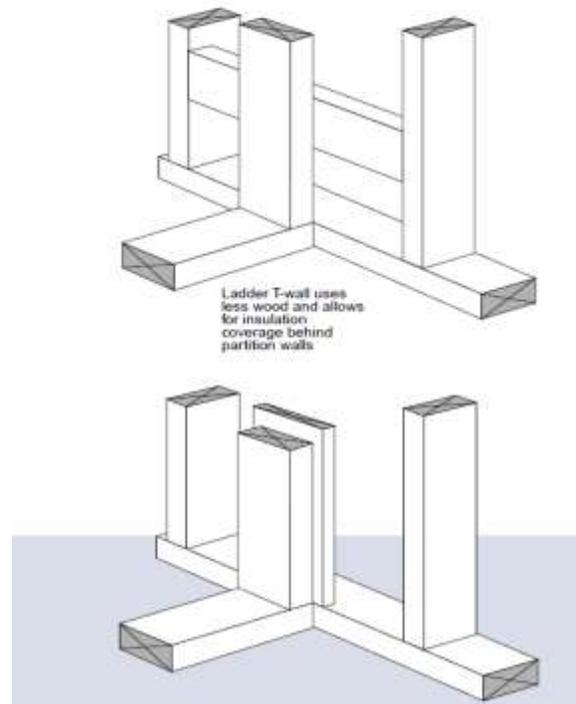
## INSIDE "TWO-STUD" CORNERS



[Two-Stud Corner](#)

## T-WALL ALTERNATIVES

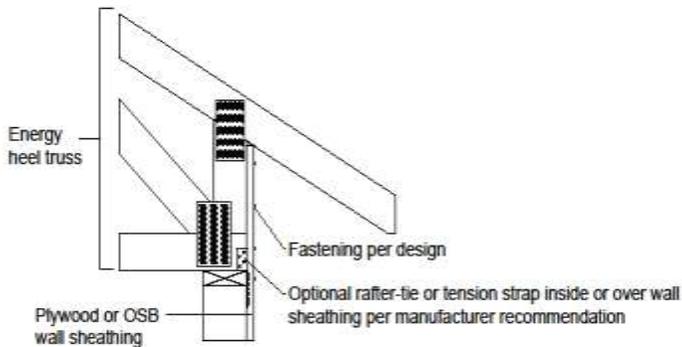
The use of ladder blocking or a full-length 1x6 or 2x6 blocking allows for increased insulation in the outer wall



[T-Wall](#)

## ENERGY HEEL TRUSS TO WALL

### WOOD STRUCTURAL PANEL OVERLAP



Ensure correct fastening of sheathing to top plate per shear wall, wall bracing, or combined shear and uplift requirements.\*

\*See rafter-tie manufacturer's instructions for installation of strap over sheathing and into framing.

[Raised-Heel Truss](#)

## Project Data Collection and Monitoring System

35 Points

### How

Collect and monitor project performance data on energy, water, and, if possible, healthy living environments for a minimum of five years. Provide data to Iowa Economic Development Authority.

For sub-metered projects, property owner /developer must agree to collect utility release forms from a percentage of occupants/units to track actual utility data of a sample of homes or non-residential spaces (Example: Main Street redevelopment project with two upper-story residential units and one first-floor commercial bay would collect release forms and data from at least one residential unit and the commercial bay). The following table identifies the percentage of units the property owner /developer must collect and track utility data, as based on the project size in total number of units.

Number of units	Percentage of units
0 – 25 units	50%
25 – 100 units	25%
100+ units	15%

### Recommendations

- Use [EPA's Portfolio Manager](#) to track utility data for multifamily and non-residential buildings
- Ensure that the training for residents and building maintenance staff includes information on how to effectively use the data collection, monitoring, and reporting system
- Best time to collect tenant utility data release forms is during tenant lease-up
- Install smart meters with continuous data and remote access to data

## Additional Reductions in Energy Use

**OPTIONAL**

(1 Point for each additional point awarded by the Home Energy Rating System (HERS) or for each 1 percent change in energy efficiency)

### How

Exceed the relevant HERS Index of 70 for single-family and low-rise residential buildings or ASHRAE 90.1-2010 by more than 15 percent for buildings of four stories or more above grade or non-residential structures.

Provide calculations for the following:

- Forecast the annual energy efficiency of the entire project to exceed ASHRAE 90.1-2010 by 15 percent;
- Analyze and adopt additional energy improvements;
- Reforecast annual energy costs with the additional improvements. Use that figure to determine the percentage of energy savings from the baseline established in the first bullet; and
- For rehabilitation projects, perform energy modeling to determine percentage that exceeds the required HERS Index of 85 or exceeds the required ASHRAE 90.1-2010 performance level.

## Resources

- [ENERGY STAR](#)
- [RESNET Certified Energy Raters](#)
- [ASHRAE](#)

5-7a	<b>Renewable Energy</b>
	<b>OPTIONAL</b> (5 Points, plus 5 points for each additional 10 percent increment, up to a maximum of 15 points)

## How

Install photovoltaic (PV) panels, wind turbines, solar assisted hot water heating or domestic hot water or other renewable source to provide at least 10 percent of the project's estimated energy demand. Describe whether the installed renewable energy system will benefit common space, occupant space, or both and how the renewable energy system will benefit the owner and occupants?

## Resources

- [Iowa Energy Center](#)
- [Iowa Renewable Energy Association](#)
- [Iowa Solar/Small Wind Energy Trade Association](#)
- [Database of State Incentives for Renewable Energy](#)
- [Department of Energy, Office of Energy Efficiency and Renewable Energy](#)

5-7b	<b>Photovoltaic (PV) / Solar Hot Water Ready</b>
	<b>OPTIONAL</b> (5 Points)

## How

Site, design, engineer, and /or plumb the development to accommodate installation of photovoltaic (PV) or solar hot water system in the future.

Minimum required south-facing exposure:

- **Single-Family and Low-Rise Buildings:** 250 square feet of unobstructed roof area that is oriented within 15 degrees of true south
- **Mid- and High-Rise Multifamily Buildings:**  $\geq$  30% of unobstructed roof area or maximum that is oriented within 15 degrees of true south

## Recommendations

- When designing a photovoltaic or solar hot water ready system, include the following in the project plans and specifications (as applicable to each technology):
  - Site map showing building(s) have southern orientation unobstructed sunlight access
  - A design schematic of the future solar array, indicating the south face, slope, and any rooftop equipment that could obstruct the array

- The type of roof to be installed (e.g., asphalt, standing seam metal, tile)
- The future location within the building for the inverter
- For solar hot water, run piping from the designed or current location of the water heater up to the prospective solar hot water collectors
- Check the local zoning laws to ensure that future buildings will not be able to shade your array
- Work with an engineer to confirm the roof can carry the dead load of the solar equipment and withstand wind loads
- Determine if roof has a warranty and if the placement of the solar equipment voids warranty
- General contractor, PV, and /or solar hot water contractor must document the information on the roof load, location of conduit, piping, and the potential location of the dash box. GC, PV, and solar hot water contractor should provide documentation to building owner and manager.
- The first cost of PV can be high, but grants and subsidies are available in many states.

**Resources**

- [National Renewable Energy Laboratory, “Solar Ready Buildings Planning Guide”](#)
- [Iowa Renewable Energy Association](#)
- [Midwest Renewable Energy Association](#)

<b>5-8</b>	<b>Advanced Metering Infrastructure</b>
	<b>OPTIONAL</b> (5 Points)

**How**

Site, design, engineer, and wire the development to accommodate installation of smart meters and /or be able to interface with smart grid systems in the future.

**Intent**

Installation of smart meters allows for more control over a project’s electricity use, to realize savings associated during off-peak times. Education on energy consumption habits will allow building occupants and owners to fully realize the environmental and economic benefits green housing offers.

**Resources**

- [Smart Grid Information Clearinghouse](#)
- [U.S. Department of Energy, “The Smart Grid: An Introduction”](#)

<b>5-9</b>	<b>ENERGY STAR Version 3.0</b>
	<b>OPTIONAL</b> (25 Points)

**How**

Design and construct the building to achieve and receive ENERGY STAR version 3.0 certification.

## Section 6: Materials Beneficial to the Environment

<b>6-1a</b>	<b>Construction Waste Management</b>
	<b>MANDATORY</b>

### How

Reduce the amount of construction waste sent to the landfill.

- Investigate and document local options for diversion (recycling, reuse, etc.) of all anticipated major constituents of the project waste stream, including cardboard packaging and “household” recyclables (e.g., beverage containers)
- Commit to following a waste management plan that is appropriate for the site and local conditions, and that prevents, recycles or salvages at least 25 percent of non-hazardous construction and demolition debris. Residential and mixed used projects may base their prevention and recycling amounts on the National Association of Home Builders’ Research Center’s industry average of 4.2 pounds of waste per conditioned square foot.

### Intent

The amount of job-site waste resulting from construction of the average (2000 sq. ft.) U.S. home is 4 pounds per square foot of conditioned space, totaling about 8,000 pounds and taking up 50 cubic yards of landfill space. (Source: National Association of Home Builders Research Center)

Approximately 20 percent of all waste landfilled in Iowa is construction and demolition debris. An estimated 520,000 tons of construction and demolition debris are landfilled in Iowa annually.

### Resources

- [Iowa Waste Exchange](#)
- [Iowa Department of Natural Resources](#)
- [Use Optimum Value Engineering \(Advanced Framing\)](#)
- [PATH: “Advanced Framing Techniques: Optimum Value Engineering”](#)
- [Best Practices for Construction Waste Management](#)
- [EPA Construction & Demolition Debris](#)
- [Construction Materials Recycling Association](#)
- [Building Materials Reuse Association](#)

<b>6-1b</b>	<b>Construction Waste Management: Additional Diversion</b>
	<b>OPTIONAL</b> (5 additional points for each additional 25% of debris prevented, salvaged or recycled up to 15 points)

### How

Reduce the amount of construction waste sent to the landfill by an additional 25 percent or more.

6-2

**Durable and Low Maintenance Exteriors****MANDATORY****How**

Specify durable siding materials such as masonry or fiber-cement to reduce or eliminate rot and reduce need for painting. Specify roofing products with  $\geq 30$  year life and document how product will save energy. Use at least 25 percent reclaimed materials or recycled content materials such as brick, framing lumber, recycled concrete and aggregates, and fly ash concrete OR select long lived non-toxic materials such as brick or cement fiber siding.

**Intent**

The use of more durable building materials and building materials that positively impact energy use, result in lower long-term maintenance and operating costs, and improve building value.

6-3

**Recycled Content Material****OPTIONAL**  
(Up to 10 points)**How**

A building material must make up at least 90% of the project component either by weight or by volume to qualify under this measure. A qualifying building material must be composed of at least 25% post-consumer recycled content or at least 50% post-industrial recycled content to achieve 2 points.

The following table lists the project components and example materials that a team can incorporate for optional points. Each material that meets the requirements of this Criterion is worth 2 points.

<b>Project Component</b>	<b>Building Material (Examples)</b>
Framing	Wood, concrete, steel, aluminum
Siding or masonry	Wood, metal, masonry
Flooring (non-structural)	Linoleum, cork, bamboo, reclaimed wood, sealed concrete, carpet
Concrete / cement and aggregate	Urbanite
Roofing	Wood shingles, asphalt shingles, tile, metal
Insulation	Fiberglass batt, cellulose, rigid panel
Sheathing	Plywood, OSB

**Recommendations**

Consider incorporation of recycled content building materials from the early stages of project design.

**Resources**

- [Green Building Supply](#)
- [Green Depot](#)
- [GreenSpec Directory, Building Green](#)
- [EPA's Comprehensive Procurement Guidelines](#)
- [Oikos Green Building Source](#)
- [Pharos Project, Healthy Building Network](#)

<b>6-4</b>	<b>Certified, Salvaged and Engineered Wood Products</b>
	<b>OPTIONAL</b> (5 Points)

**How**

Commit to using wood products and materials of at least 25%, by cost, that are either:

- Certified in accordance with the Forest Stewardship Council
- Salvaged products
- Engineered framing materials that do not include urea formaldehyde-based binders (see Criterion 7.3)

The percentage of certified, salvaged, and engineered wood products is based on cost or value.

**Intent**

Less than 10% of the old growth forest remains in the United States. The use of salvaged wood and engineered wood products precludes the need to use old-growth lumber. Forest Stewardship Council-certified wood encourages forestry practices that are environmentally responsible.

**Equation**

Sum of the value of all certified, salvaged, or engineered wood products	÷	The value of all wood products as structural components	=	Percentage of total wood products that meet this criterion
--	---	---	---	--

**Resources**

- [Forest Stewardship Council](#)
- [Building Materials Reuse Association](#)
- [Habitat for Humanity Iowa ReStores](#)

<b>6-5a</b>	<b>Reducing Heat-Island Effect – Roofing</b>
	<b>OPTIONAL</b> (5 Points)

**How**

**Option 1**

Use ENERGY STAR-compliant roofing, which requires:

	Roof Slope	Initial Solar Reflectance	Maintained Solar Reflectance	Emissivity
<b>Low slope</b>	≤ 2:12	≥ 0.65	≥ 0.50	0.8
<b>Steep slope</b>	> 2:12	≥ 0.25	≥ 0.15	0.8

Emissivity should be greater than or equal to 0.8 when tested in accordance with ASTM 408. For Option 1, 100% of the roof area must meet the requirements above to achieve optional points.

**OR Option 2**

Install a “green” (vegetated) roof for at least 50% of the roof area.

*Combinations of ENERGY STAR–compliant and vegetated roofing can be used, providing they collectively cover 75% of the roof area.*

**Intent**

Urban heat islands increase local air temperatures due to the absorption of solar energy by the built environment. Reducing the heat island effect decreases energy consumption by decreasing loads on cooling systems.

**Resources**

- [Cool Roof Rating Council, Directory of Rated Products](#)
- [Environmental Protection Agency, Heat Island Effect](#)
- [Lawrence Berkeley National Laboratory, Heat Island Group](#)
- [Green Roofs for Healthy Cities](#)
- [Green Roofs](#)

<b>6-5b</b>	<b>Reducing Heat-Island Effect – Paving</b>
	<b>OPTIONAL</b> (5 Points)

**How**

Use light-colored, high-albedo materials and/or an open-grid pavement, with a minimum solar reflectance of 0.3, over at least 50% of the site’s hardscaped area.

**Intent**

Urban heat islands increase local air temperatures due to the absorption of solar energy by the built environment. Reducing the heat island effect decreases energy consumption by decreasing loads on cooling systems.

**Resources**

- The Solar Reflectance Index (SRI) is a measure of the constructed surface’s ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980-01.
- [Environmental Protection Agency, Heat Island Effect](#)
- [Lawrence Berkeley National Laboratory, Heat Island Group](#)
- [Trees Forever](#)

**Reducing Heat-Island Effect – Plantings****OPTIONAL**  
(5 Points)**How**

Locate trees or other plantings to provide shading for at least 50% of sidewalks, patios, and driveways within 50 feet of the building. Shading should be calculated for noon on June 21, when the sun is directly overhead, based on five years' growth.

**Intent**

Urban heat islands have increased local air temperatures due to the absorption of solar energy by the built environment. They increase energy consumption by increasing loads on cooling systems. Heat islands create thermal gradient differences between developed and undeveloped areas. Use paving surfaces that do not retain heat and reduce the heat island effect.

**Resources**

- [Trees Forever](#)
- [Iowa Department of Natural Resources Bureau of Forestry](#)
- [Iowa Living Roadway Trust Fund Native Plant Database](#)
- [Iowa Prairie Network](#)

## Section 7: Healthy Living Environment

7-1

### Low / No VOC Paints and Primers

MANDATORY

#### How

Specify that all interior paints and primers must comply with current Green Seal standards for low VOC limits. Specify pre-finished products or low VOC stains, varnishes, and lacquers.

#### Intent

VOCs are chemicals containing carbon molecules that are volatile enough to evaporate from material surfaces into indoor air at normal temperatures. Interior paints and primers that release VOCs may pose health hazards to residents and workers. Outdoors, VOCs react with sunlight and nitrogen in the atmosphere to form ground level ozone, a chemical that has a detrimental effect on human health and ecosystems. Ozone damages lung tissue, reduces lung function and sensitizes the lungs to other irritants. Use of low-VOC paints and primers will reduce the concentration of such airborne chemicals.

#### Resources

- [Green Seal](#)
- [Green Seal Standard GS-11](#) edition 3.1, July 12, 2013, shows the below VOC limits for paints:

Product Type	VOC Level (g/L)
<i>Flat Topcoat</i>	50
<i>Non-Flat Topcoat</i>	100
<i>Primer or Undercoat</i>	100
<i>Floor Paint</i>	100
<i>Anti-Corrosive Coating</i>	250
<i>Reflective Wall Coating</i>	50
<i>Reflective Roof Coating</i>	100

7-2

### Low / No VOC Adhesives and Sealants

MANDATORY

#### How

All adhesives must comply with Rule 1168 of the South Coast Air Quality Management District. All caulks and sealants must comply with Regulation 8, Rule 51, of the Bay Area Air Quality Management District (BAAQMD).

#### VOC Limits

[South Coast Air Quality Management District \(AQMD\), Rule 1168](#), establishes VOC limits for adhesives.

## AQMD Architectural Applications Current VOC Limit

Less water and less exempt compounds in grams per liter

Product Type	VOC Limit (G / L)
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesives	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250

[Bay Area Air Quality Management District Regulation 8, Rule 51](#), establishes VOC limits for sealants.

**8-51-301 Adhesive Product, Application Limits:** Except as provided in Section 8-51-305, a person shall not use in the following applications any adhesive product with a VOC content, as defined in Section 8-51-226, that exceeds the following VOC limits (expressed as grams of VOC per liter):

BAAQMD VOC Standards	VOC Limit (G / L)
Indoor floor covering installation	150
Multipurpose construction	200
Nonmembrane roof installation / repair	300
Outdoor floor covering installation	250
Single-ply roof material installation / repair	250
Structural glazing	100
Ceramic tile installation	130
Cove base installation	150
Perimeter bonded sheet vinyl flooring installation	660

### Intent

Interior adhesives and sealants may release VOCs, particularly when wet. Exposure to individual VOCs and mixtures of VOCs can cause or aggravate health conditions, including allergies, asthma, and irritation of the eyes, nose, and airways; however, no health-based standards for indoor non-occupational exposure have been set.

### Recommendations

- Many construction adhesives are not capable of adhering at temperatures below 40°F.
  - Projects located in cold climates only (Climate Zones 6 and 7, based on IECC 2012) may be exempted from the required low-VOC adhesives and sealants if they prove problematic due to the above reason.
- Avoid epoxy-based caulks and epoxy-based sealants, as these contain Bisphenol A.

## Resources

- [U.S. Department of Energy, “Weatherize Your Home — Caulk and Weather Strip”](#)
- [Green Building Supply](#)
- [Green Seal](#)

7-3

## Composite Wood Products that Emit Low / No Formaldehyde

**MANDATORY**

### How

All composite wood products (plywood, OSB, MDF, cabinetry) must be certified compliant with California 93120. If using a composite wood product that does not comply with California 93120, all exposed edges and sides must be sealed with low-VOC sealants, per Criterion 7-2.

### Intent

Composite wood products using formaldehyde-based binders will emit formaldehyde, which is a volatile organic compound. Symptoms of exposure vary widely and include a host of bodily reactions. Avoiding products that emit formaldehyde will reduce the quantity of harmful indoor air contaminants.

## Resources

- Make this requirement part of the specifications for sub-contractor submittals. Obtain the manufacturer’s specifications to determine whether materials meet this requirement.
- Seek composite wood products with no added formaldehyde-based compounds in the contents. Seek composite wood products with CARB No Added Formaldehyde (NAF) certification. [Scientific Certification Systems](#) offers a Formaldehyde Free certification, and product listings.
- If feasible, specify formaldehyde-free hardwood, plywood, particleboard, or medium density fiberboard.

7-4a

## Environmentally Preferable Flooring

**MANDATORY**

If project scope includes provision of flooring

### How

- Do not install carpets in entryways, laundry rooms, bathrooms, kitchens / kitchenettes, utility rooms, or any rooms of ground-connected floors.
- Hard surface flooring products must be ceramic tile or unfinished hardwood floors or meet [Scientific Certification System’s FloorScore](#) criteria (including pre-finished hardwood flooring).
- Any carpet products used must meet the [Carpet and Rug Institute’s Green Label or Green Label Plus](#) certification for carpet, pad, and carpet adhesives.
- The use of reclaimed flooring is encouraged, and such flooring need not meet the FloorScore certification. Reclaimed wood flooring should be free of lead-based paint, and tiles should be free of asbestos.

### Intent

More durable flooring options that last longer and wear better than carpet promote resource conservation through their longevity. New carpets, padding, and adhesives also release VOCs that may pose health hazards to residents and workers. In addition, carpets trap dust and other allergens.

### Recommendations

- Throughout the home, consider non-carpet flooring alternatives such as natural linoleum; Forest Stewardship Council (FSC)–certified or salvaged hardwoods; cork; bamboo; ceramic or stone tile; or sealed concrete.
- Make this requirement part of the specifications for sub-contractor submittals.

### Resources

- [Scientific Certification System's FloorScore](#)
- [Carpet and Rug Institute's Green Label or Green Label Plus Products](#)
- [Healthy Building Network's Pharos Project: Compare Flooring Products](#)

7-4b	<b>Environmentally Preferable Flooring: Alternative Sources</b> <p style="text-align: right;"><b>Optional</b> (Up to 5 points)</p>
------	---

### How

Use non-vinyl, non-carpet floor coverings in all rooms of the building.

### Intent

Natural and renewable alternative flooring materials have demonstrated environmental benefits, including low levels of VOC emissions and environmentally friendly production methods. These products are good substitutes for standard products linked with certain health hazards.

### Recommendations

- Whenever possible, select resilient flooring that has passed a California 01350 test (FloorScore, CHPS) or NSF/ANSI 332. For [California 01350](#), give highest preference to those that pass the residential version of the test, as the residential test is more stringent.
- Use alternative flooring materials such as natural linoleum, ceramic tile, bamboo, cork, or hardwood (especially salvaged wood)
- For basements, leave the slab exposed and stained with low-VOC material rather than providing any floor treatments

### Resources

- [BuildingGreen: Green Building Products](#)
- [Healthy Building Network's Pharos Project: Compare Flooring Products](#)

**How**

Follow the specifications below for residential and non-residential bathroom ventilation.

For residential projects:

Install [ENERGY STAR](#) labeled intermittent bathroom fans with exhaust vented to the outdoors. Exhaust fans need to be connected to a light switch, and equipped with a humidistat sensor, timer, or other control (e.g., occupancy sensor, delay off switch, ventilation controller). Intermittent bathroom fans should operate at a minimum exhaust rate of 50 cubic feet per minute (CFM) to the outdoors, per ASHRAE 62.2-2010.

**OR**

Install [ENERGY STAR](#) labeled continuous bathroom fans with exhaust vented to the outdoors. This should operate continuously at a rate of 20 CFM, per ASHRAE 62.2-2010.

**OR**

Install central ventilation systems to meet ASHRAE requirements (see Criterion 7-6) with rooftop fans that meet the following criteria:

- Roof fans up to 300 design CFM must be direct-drive and variable-speed control with speed controller mounted near the fan.
- Roof fans between 300–2000 design CFM must be direct-drive, variable-speed control, and electronically commutated motors (ECM), with speed controllers mounted near the fan.

For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2010 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

**Intent**

Properly sized and controlled exhaust fans in bathrooms and kitchens reduce moisture condensation, lowering the potential for indoor mold growth that may yield odors and pose health hazards to residents. Besides helping to reduce moisture, kitchen fans also help remove carbon dioxide and carbon monoxide over fuel-burning appliances and other air contaminants that may be byproducts of cooking. ENERGY STAR-qualified fans use 65 percent less energy on average than standard models and move more air per unit energy used with less noise. Timers and humidistat sensors help ensure that fans regularly remove moisture and provide increased ventilation.

**Resources**

- [ENERGY STAR Fans](#)
- [Home Ventilating Institute](#)
- [Building Science Corporation](#)
- [ASHRAE Standard 62.1-2010](#)

<b>7-5b</b>	<b>Exhaust Fans – Kitchen</b>	
	<b>MANDATORY</b> For New Construction and Gut Rehabilitation	<b>OPTIONAL (5 points)</b> Rehabilitation

**How**

Follow the specifications below for residential and non-residential kitchen ventilation.

For residential projects:

Install power-vented fans or range hoods with exhaust vented to the outdoors at an intermittent rate of 100 CFM, per ASHRAE 62.2-2010.

**OR**

Install power-vented fans or range hoods with exhaust vented to the outdoors at a continuous rate of five air changes per hour based on kitchen volume.

**OR**

Install central ventilation systems to meet ASHRAE requirements (see Criteria 7.6a and 7.6b) with rooftop fans that meet the following criteria:

- Roof fans up to 300 design CFM must be direct-drive and variable-speed control with speed controller mounted near the fan
- Roof fans between 300–2000 design CFM must be direct-drive, variable-speed control, and ECM with speed controllers mounted near the fan

For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2010 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

**Intent**

Properly sized and controlled exhaust fans in bathrooms and kitchens reduce moisture condensation, lowering the potential for indoor mold growth that may yield odors and pose health hazards to residents. Besides helping to reduce moisture, kitchen fans help remove carbon dioxide and carbon monoxide over fuel-burning appliances and other air contaminants that may be byproducts of cooking.

**Recommendations**

- Avoid oversized range fans, which can depressurize homes and cause back-drafting of combustion appliances
- Placing a single multi-port, in-line fan in each apartment to exhaust air from the kitchen and bathroom(s) is an acceptable ventilation strategy. In addition to meeting local code requirements for the minimum distance of thru-wall exhaust vents from windows, the in-line fan must be ENERGY STAR labeled, and the kitchen and bathroom exhaust ventilation rates must comply with ASHRAE 62.2-2010. Ensure that the placement of the exhaust grill meets code requirements for kitchen ventilation.

**Resources**

- [ENERGY STAR](#)
- [ASHRAE Advanced Energy Design Guides](#)

## Balanced Ventilation System

### MANDATORY

For New Construction and Gut Rehabilitation

### OPTIONAL (10 points)

Rehabilitation

#### How

##### Single-Family and Low-Rise Multifamily:

Install a balanced ventilation system for each dwelling unit capable of providing adequate fresh air per ASHRAE 62.2-2010 requirements for single-family and low-rise multifamily dwellings.

Use the following formula, or refer to the table below as a reference for calculating the ventilation rate.

$$[7.5 \text{ CFM per } (\# \text{ of bedrooms} + 1)] + [1 \text{ CFM per } 100 \text{ ft}^2 \text{ of floor area}] = (\text{ASHRA E } 62.2-2010)$$

##### Multifamily, four stories or more:

Install a balanced ventilation system capable of providing adequate fresh air per ASHRAE 62.2-2010 for all dwelling units, and ASHRAE 62.1-2010 for all hallways and common spaces.

$$[7.5 \text{ CFM per } (\# \text{ of bedrooms} + 1)] + [1 \text{ CFM per } 100 \text{ ft}^2 \text{ of floor area}] = (\text{ASHRA E } 62.2-2010)$$

AND

$$[0.06 \text{ CFM per ft}^2 \text{ of common corridors} + 25 \text{ CFM} / 1000 \text{ ft}^2] = (\text{ASHRA E } 62.1-2010)$$

Alternatively, project teams can use the table below from ASHRAE 62.2-2010 to determine required ventilation rates. Note that the table provides ventilation air requirements for a single family or a multifamily unit. Thus, the floor area and number of bedrooms listed should be used to derive the required CFM for each unit. Then the units should be aggregated along with the required CFM for the common space to reach the total required CFM for the project.

#### Ventilation air requirements (in CFMs)

FLOOR AREA (BY UNIT) FT <sup>2</sup>	Bedrooms (by unit)				
	0-1	2-3	4-5	6-7	>7
< 1500	30	45	60	75	90
1501 – 3000	45	60	75	90	105
3001 – 4500	60	75	90	105	120
4501 – 6000	75	90	105	120	135
6001 – 7500	90	105	120	135	150

For Substantial Rehab projects, consult Appendix A of ASHRAE 62.2-2010.

##### Multifamily Projects with Central Ventilation Systems:

Establish ventilation rates for bathrooms, kitchens, and units based on ASHRAE 62.2-2010 requirements. Using these ventilation levels, install a centralized ventilation system that is balanced to run at the required ASHRAE 62.2-2010 levels for each unit and 62.1-2010 levels for common spaces.

##### For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2010 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

## Intent

Optimal ventilation improves indoor air quality and the flow of fresh air throughout the building, contributing to a healthier living environment.

## Recommendations

- With continuous, demand-controlled, or other centralized ventilation systems, the project team (specifically, the designer, installer, and maintenance staff) should ensure that the systems are balanced from unit to unit to meet the requirements of ASHRAE 62.2-2010.
- Also, consider the following guidance:
  - For fans designed to exhaust more than 250 CFM, consider using ECM with speed controllers mounted near the fan for ease of balancing
  - For fans designed to exhaust less than 250 CFM, consider using direct drive with speed controller mounted near the fan for ease of balancing
  - For climate-specific strategies, project teams should consult ASHRAE 62.2-2010
  - For projects located in hot and humid climates, systems should be designed to be capable of ASHRAE 62.2 ventilation levels. Supplemental dehumidification is likely necessary for compliance in these climates to maintain comfort during times of high ambient relative humidity. Additionally, the goal should be to design a system to meet ASHRAE requirements and then provide for additional accommodations to adjust the amount of outside air flow being introduced.
- Consider the following controls for introducing outside air:
  - Flow control / butterfly damper to allow for control over the amount of air being introduced through the outside air intake
  - Shut-off damper (electronic or barometric) to close off the outside air intake when the HVAC system is not calling for air
  - Fan timer /cyclers on the system that allows for control over how many minutes of a “system run cycle” the outside air intake remains open
  - Per ASHRAE ventilation requirements, reliance on operable windows is not permitted as a strategy to meet ASHRAE 62.2 whole-project ventilation requirements

## Resources

- [EPA Indoor Air Plus Qualified Home and ENERGY STAR](#)
- [Common Questions about Heat and Energy Recovery Ventilators](#)
- [Building Science Corporation Residential Ventilation Technologies Publications](#)
- [National Center for Healthy Housing, Ventilation Fact Sheets](#)

7-7

## Water Heaters – Mold Prevention

**MANDATORY**

## How

Provide adequate drainage for water heaters including drains or catch pans with drains piped to the exterior of the dwelling. If water heater is located above conditioned space a catch or drain pan is installed.

Water heaters should be located in rooms with non–water sensitive floor coverings. Drain pans should be sloped and corrosion resistant (e.g., stainless or plastic) with drains at the low point. Condensate lines should be drained to a drainage system, and not just deposited under slab.

**Intent**

The use of heaters with drains and catch pans prevents moisture problems caused by leakage or overflow. This prevents water from sitting idle, creating excess moisture and allowing mold to germinate.

**Resources**

- [ASHRAE Standard 62.1-2010 User’s Manual](#)
- [International Code Council, “Mold: Tips on Prevention and Control”](#)
- [EPA Mold Resources](#)
- [Building Science Corporation](#)

<b>7-8</b>	<b>Cold and Hot Water Pipe Insulation</b>
	<b>MANDATORY</b>

**How**

Insulate exposed cold and hot water pipes in climates and building conditions susceptible to moisture condensation. Hot water pipes must be insulated to a minimum of R-3

**Intent**

Insulation of cold water pipes prevents condensation that can lead to mold growth. Wherever there is a high differential between indoor air temperatures and the temperature of water supplies; such as in locations with moderate-to-high humidity, condensation on cold water pipes is likely to occur. Plumbing on exterior walls may be exposed to substantial variations in temperature making it more vulnerable to leakage or damage.

**Resources**

- [Building Science Corporation, “Building America Quality Control Checklist”](#)

<b>7-9a</b>	<b>Materials in Wet Areas – Surfaces</b>
	<b>MANDATORY</b>

**How**

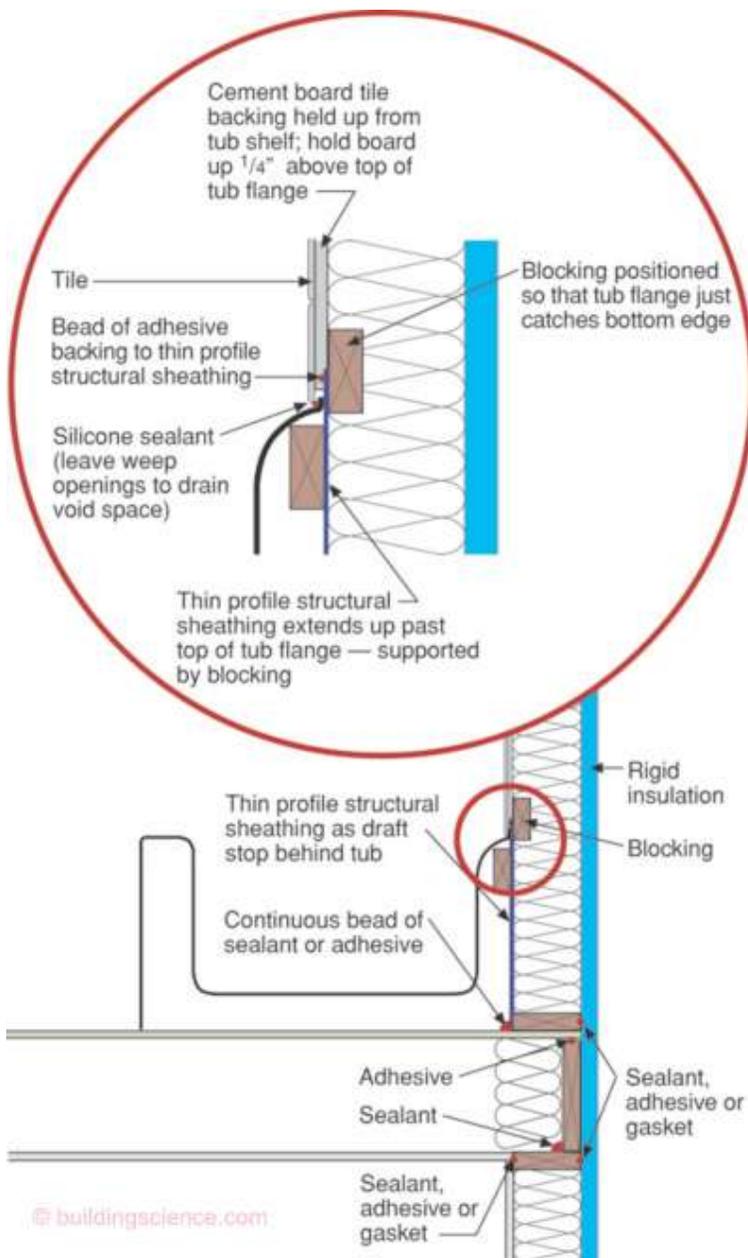
In wet areas, use materials that have smooth, durable, cleanable surfaces. Do not use mold propagating materials such as vinyl wallpaper and unsealed grout.

**Intent**

The use of moisture-resistant materials in wet areas such as bathrooms reduces moisture buildup, diminishing the potential for indoor mold growth that may yield odors and pose health hazards to residents.

**How**

Use fiberglass or similar enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board or equivalent (i.e., not paper-faced).



[Draft Stopping and Air Barrier Tub Enclosure – Building Science Corporation](https://www.buildingscience.com)

**Intent**

The use of moisture-resistant materials in wet areas such as bathrooms reduces moisture buildup, diminishing the potential for indoor mold growth that may yield odors and pose health hazards to residents.

**How**

Follow the specifications below.

Beneath concrete slabs, including basements:

- Provide vapor barriers under all slabs
- For concrete floors either in basements or the on-grade slab, install a capillary break of 4 inches of clean or washed gravel (0.5 inch diameter or greater) placed over soil.
- Cover all gravel with a 10 millimeter polyethylene sheeting moisture barrier, with joints overlapped a minimum of 6” and taped to prevent moisture from migrating from the soil through the slab to a living or storage area.
- Install at least 1” (R-5) extruded polystyrene below the entire slab (2” (R-10) of foam under at least the outer four feet of the slab perimeter) in addition to the vapor barrier to control mold growth.
- Place a capillary break on top of footings between the footing and foundation wall to stop capillary action.
- On interior below-grade walls, do not use a vapor barrier over air-permeable insulation. Do not install a below-grade vertical insulation (such as polyethylene sheeting, vinyl wallpaper or foil faced), which can trap moisture inside wall systems. Semi-vapor permeable rigid insulation is not considered a vapor barrier.

Beneath Crawl Spaces

- Install a minimum of 10-millimeter cross-laminated polyethylene on the crawl floor, extended at least 12 inches up on piers and foundation walls. Overlap joints a minimum of 6” and tape or seal all seams.
- Line the likely “high-traffic” areas of the crawl space with foam board, so the polyethylene beneath will not be disturbed.



[Slab Insulation](#)



[Capillary Break](#)

**Intent**

Water can migrate through concrete and most other masonry materials. Proper foundation drainage prevents water from saturated soils from being pushed by hydrostatic pressure through small cracks. Vapor barriers and waterproofing materials can greatly reduce the migration of moisture that can occur even in non-saturated soils. Installation of radon-resistant features will reduce concentrations of radon, a cancer-causing soil gas that can leak into homes through cracks in the slab and foundation.

## Recommendations

- Ensure that other trades' work does not puncture the vapor barrier.

## Resources

- [Advanced Energy—Crawl Spaces](#)
- [Building Science Corporation, “Capillarity—Small Sacrifices”](#)
- [Building Science Corporation, “Understanding Basements”](#)
- [Department of Energy, “Slab Insulation”](#)

7-10b	<b>Basements and Concrete Slabs – Radon</b>
	<b>MANDATORY</b> For New Construction and Gut Rehabilitation

## How

For residential construction:

Following Appendix F, [“Radon Control Methods,” 2012 International Residential Code](#), or other codes as appropriate for your project size and type, install passive radon-resistant features below the slab along with a vertical vent pipe with junction box available, if an active system should prove necessary. Install sealed sump pump. See image on next page.

For gut rehabilitation projects, test the home or building for presence of radon. If elevated levels of radon exist, introduce radon-reduction measurements. Check technical guidance at [www.epa.gov/iaq/radon/pubs/index.html](http://www.epa.gov/iaq/radon/pubs/index.html).

For non-residential construction:

For new construction projects, follow the guidance contained in the EPA document, [“Radon Prevention in the Design and Construction of Schools and other Large Buildings.”](#)

For gut rehabilitation projects, test for presence of radon. If elevated radon levels exist, introduce radon-reduction measurements. See technical guidance at [www.epa.gov/iaq/radon/pubs/index.html](http://www.epa.gov/iaq/radon/pubs/index.html).

## Intent

Installation of radon-resistant features will reduce concentrations of radon, a cancer-causing soil gas that can leak into homes through cracks in the slab and foundation.

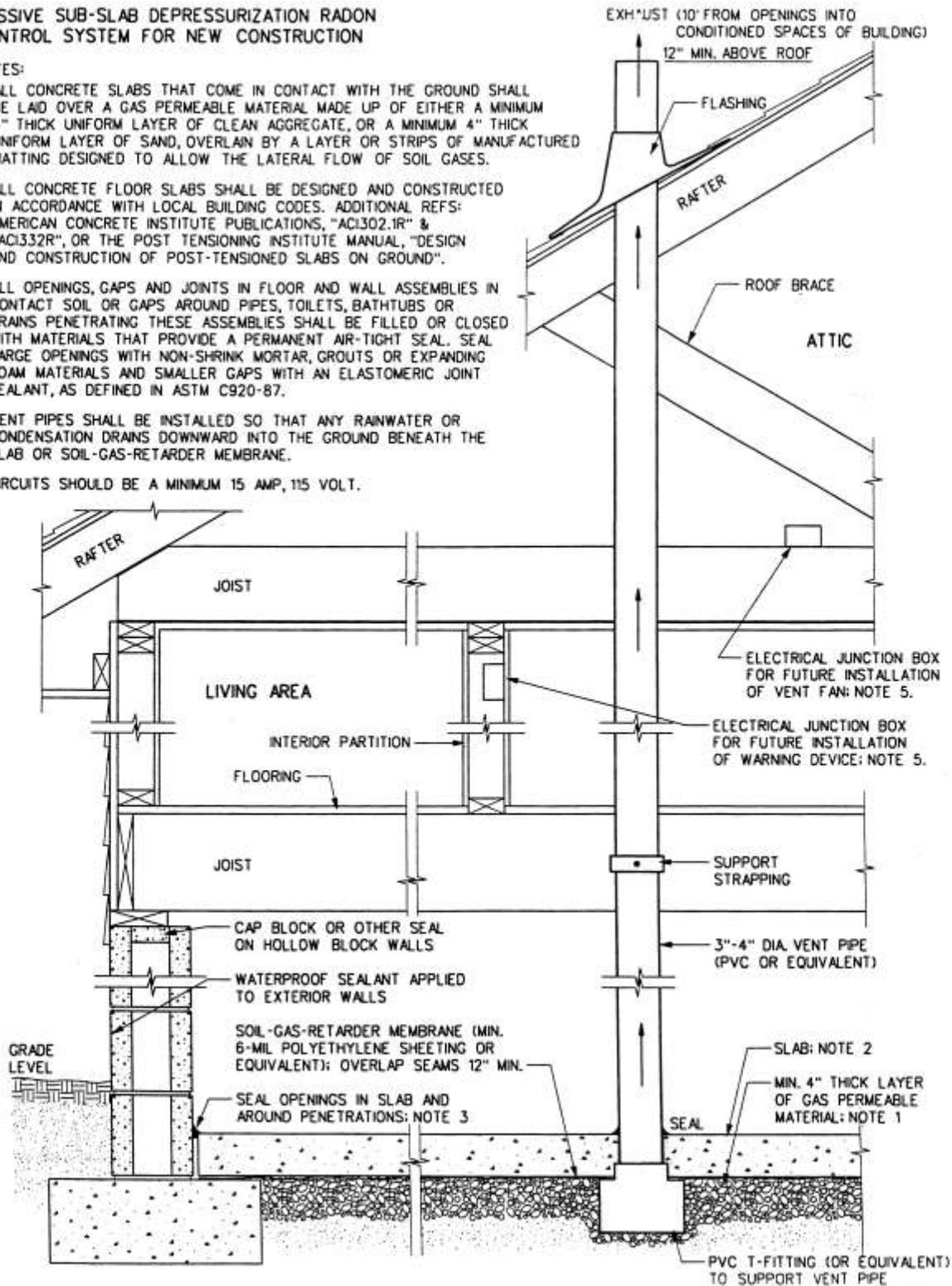
## Resources

- [Iowa Department of Public Health](#)
- [U.S. EPA Map of Radon Zones](#)
- [“Radon-Resistant Construction: Low-Rise Multi-Family Housing”](#)
- [“Building Radon Out: a Step-by Step Guide on How to Build Radon Resistant Homes”](#)
- [International Code Council](#)

**PASSIVE SUB-SLAB DEPRESSURIZATION RADON CONTROL SYSTEM FOR NEW CONSTRUCTION**

**NOTES:**

1. ALL CONCRETE SLABS THAT COME IN CONTACT WITH THE GROUND SHALL BE LAID OVER A GAS PERMEABLE MATERIAL MADE UP OF EITHER A MINIMUM 4" THICK UNIFORM LAYER OF CLEAN AGGREGATE, OR A MINIMUM 4" THICK UNIFORM LAYER OF SAND, OVERLAIN BY A LAYER OR STRIPS OF MANUFACTURED MATTING DESIGNED TO ALLOW THE LATERAL FLOW OF SOIL GASES.
2. ALL CONCRETE FLOOR SLABS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH LOCAL BUILDING CODES. ADDITIONAL REFS: AMERICAN CONCRETE INSTITUTE PUBLICATIONS, "ACI302.1R" & "ACI332R", OR THE POST TENSIONING INSTITUTE MANUAL, "DESIGN AND CONSTRUCTION OF POST-TENSIONED SLABS ON GROUND".
3. ALL OPENINGS, GAPS AND JOINTS IN FLOOR AND WALL ASSEMBLIES IN CONTACT SOIL OR GAPS AROUND PIPES, TOILETS, BATHTUBS OR DRAINS PENETRATING THESE ASSEMBLIES SHALL BE FILLED OR CLOSED WITH MATERIALS THAT PROVIDE A PERMANENT AIR-TIGHT SEAL. SEAL LARGE OPENINGS WITH NON-SHRINK MORTAR, GROUTS OR EXPANDING FOAM MATERIALS AND SMALLER GAPS WITH AN ELASTOMERIC JOINT SEALANT, AS DEFINED IN ASTM C920-87.
4. VENT PIPES SHALL BE INSTALLED SO THAT ANY RAINWATER OR CONDENSATION DRAINS DOWNWARD INTO THE GROUND BENEATH THE SLAB OR SOIL-GAS-RETARDER MEMBRANE.
5. CIRCUITS SHOULD BE A MINIMUM 15 AMP, 115 VOLT.



[Passive Sub-Slab Radon Control System](#)

**How**

Provide drainage of water to the lowest level of concrete away from windows, walls and foundations by implementing the following techniques. See best practice images and resources on next page.

- Water management – Walls
  - Provide a housewrap/weather resistive barrier with sheets lapped, shingle style, especially over windows, doors and other penetrations to prevent rain water that penetrates the finished exterior cladding system, from entering the wall assembly or being introduced into window or door openings
  - Provide a pathway for liquid water that has penetrated the cladding system or accumulates due to daily or seasonal changes in thermal and humidity levels behind the cladding system to safely exit the exterior wall assembly
  - Flashing and/or weather-resistive barriers installed in rough window and door openings must integrate with window and door unit flashings, particularly at the sill and head
  - Install pan flashing, side flashing that extends over pan flashing, and head flashing (top flashing) that extends over side flashing on windows and exterior door openings. Apply window pan flashing over building paper at sill and corner patches.
  - Flashings at roofs wall intersections and at penetrations through the wall (i.e. plumbing, electrical, vents, HVAC refrigerant lines, etc.) that are provided by other trades must be integrated with the drainage plane to keep water from entering the wall assembly



[Water Management - Walls](#)



[Water Management - Foundations](#)

- Water Management - Roof Systems
  - Installation of drip edge at entire perimeter of roof.
  - Flashing where sloped roofs meet gable wall end/all vertical wall integrated into building drainage plane.
  - Use of kick-out flashings at all wall eave intersections integrated into drainage plane.
  - At wall/roof intersections maintain  $\geq 2$ " clearance between wall cladding and roofing materials.



[Water Management - Roofs](#)



[Flashing Integrated into Drainage Plane](#)

- Integrity and Continuity of the Thermal Barrier
  - The drainage plane, when properly sealed, can also reduce airflow through the wall assembly, which improves the thermal performance of the cavity insulation.



[Fully Sealed Drainage Plane](#)

### Resources

- [Water Management System Builder Checklist Guide](#)
- [Energy and Environmental Building Alliance, "Water Management Guide"](#)
- [Building Science Corporation](#)

<b>7-12</b>	<b>Garage Isolation</b>	<b>MANDATORY</b>
-------------	-------------------------	------------------

### How

For residential projects:

- Provide a continuous air barrier between the conditioned (living) space and any unconditioned garage space to prevent the migration of any contaminants into the living space
- Do not install HVAC equipment in a garage unless required by code
- All connecting doors between living space and garage shall include an automatic closer, and shall be fixed with gaskets or otherwise made substantially air-tight with weather stripping
- In single-family houses install a CO alarm inside the house on the wall that is attached to the garage and outside the sleeping area
- If any HVAC supply or returns run is located in a garage to house cavity the exterior of the cavity must be insulated to a minimum of an R6

For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2010 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

**Resources**

- Refer to ASHRAE 62.2 to specify garage contaminant isolation measures for residential projects.
- [NIST, “Air and Pollutant Transport from Attached Garages to Residential Living Spaces”](#)

<b>7-13</b>	<b>Clothes-Dryer Exhaust</b>
	<b>MANDATORY</b>

**How**

Clothes dryers must be exhausted directly to the outdoors with a rigid type vent or via a heat or energy recovery ventilation system if applicable and appropriate.

**OR**

Install ventless dryers.

**Intent**

Outdoor venting of clothes dryers substantially reduces air moisture that can lead to mold growth.

**Recommendations**

It is important to minimize duct run to avoid build up of moisture and particles that can inhibit the flow of air. Rigid duct materials help ensure clean ducts and reduce build up on particles and moisture.

<b>7-14</b>	<b>Integrated Pest Management</b>
	<b>MANDATORY</b>

**How**

Seal all wall, floor and joint penetrations with low VOC caulking to prevent pest entry. Provide rodent and corrosion proof screens (e.g., copper or stainless steel mesh) for large openings.

**Intent**

Sealing of cracks and penetrations will minimize entry points for pests.

**Resources**

- [National Center for Healthy Housing, “Integrated Pest Management”](#)
- [Integrated Pest Management Checklist](#)
- [Model Request for Proposal for Integrated Pest Management](#)
- [Iowa State University’s Department of Entomology](#)
- Consider a no spray policy to be included in maintenance and resident manuals for cockroaches and rodents.

<b>7-15</b>	<b>Smoke-free Building</b>
	<b>OPTIONAL</b> (2 Points)

**How**

Implement and enforce a “no smoking” policy in all common and individual living areas of all buildings. Common areas include rental or sales offices, entrances, hallways, resident services areas, and laundry rooms.

**Resources**

- [Iowa Smokefree Air Act](#)
- [American Lung Association, Healthy Air at Home](#)
- [U.S. EPA, Indoor Air Quality Division](#)

<b>7-16</b>	<b>Combustion Equipment</b> (includes space and water-heating equipment)
	<b>MANDATORY</b>

**How**

Specify power vented or combustion sealed equipment. One hard-wired carbon monoxide (CO) detector shall be installed for each sleeping area, minimum one per floor.

**Intent**

Direct vent systems draw all the air needed directly from the outside so there is no risk of spilling combustion contaminants into the residence. Power vented equipment uses a fan or blower to create the pressure difference that causes air to flow from inside the house, through the combustion device out an approved chimney or vent system to the outdoors.

**Resources**

- [U.S. Environmental Protection Agency, Combustion Gases](#)
- [U.S. EPA, Carbon Monoxide](#)
- [Underwriters Laboratories](#)

## Section 8: Operations and Maintenance

8-1

### Building Maintenance Manual

MANDATORY

#### How

Provide a manual that addresses the following:

- Operations and maintenance guidance for all appliances
- HVAC operation and maintenance schedule
- Location of water-system turnoffs
- Lighting equipment
- Paving materials and landscaping
- Green cleaning products and schedule(s)
- Pest control
- Any other systems within the project, including renewable energy systems if applicable
- An occupancy turnover plan that describes the turnover process, including all materials that are frequently replaced at turnover and the process of educating the residents about proper use and maintenance of all project systems

#### Recommendations

- During the design process, keep a running list of how maintenance and landscaping teams and residents may need to be involved with the building in order to ensure that its lifespan is maximized and that it will perform as intended. Once the project team has completed the integrative design process (see Criterion 1.1), amend templates of the Operations and Maintenance documents with project-specific information for maintenance and residents.
- Manuals and other training materials are most effective when presented in conjunction with training sessions. These educational sessions give the project maintenance staff an opportunity to share best practices and troubleshoot project performance problems together.
- Consider developing an integrated pest management (IPM) policy and, as part of that, develop guidance related to pesticide use, housekeeping, and prompt reporting of pest problems to be included in maintenance manuals
- If the project is utilizing greywater, design and institute a policy that requires biodegradable soaps, cleaners, and other products that are flushed down the drains
- Provide maintenance staff with local information for handling hazardous waste, including fluorescent and compact fluorescent lighting (CFLs)

#### Resources

- [The Center on Sustainable Communities Homeowner Handbook](#)
- [Enterprise Green Communities, Building Maintenance Manual Templates](#)
- [National Center for Healthy Housing, "Healthy Homes Maintenance Checklist"](#)

**How**

Provide a guide for building tenants and homeowners that explains the intent, benefits, use, and maintenance of green building features. Also include transit information, neighborhood amenities, and encourage additional green activities such as recycling, gardening, use of healthy cleaning materials.

For residential projects, as applicable, include these additional instructions within the manual:

- A routine maintenance plan
- Operations and maintenance guidance for all appliances and special plumbing fixtures
- HVAC operation
- Cautions or appropriate maintenance on renewable energy systems
- Location of water-system turnoffs
- Lighting equipment
- Interior finish materials, including paints, caulks, and flooring
- Paving materials and landscaping
- Pest control
- Special health considerations if greywater is used indoors (e.g., do not drink from the toilet in emergency situations)
- Any other systems that are part of the home

**Intent**

Education on the operations and maintenance of the home will allow residents to fully realize the environmental, health, and economic benefits that green design and construction offers.

**Resources**

- [The Center on Sustainable Communities Homeowner Handbook](#)
- [Enterprise Green Communities, Resource Templates](#)
- [A Green Home is a Healthy Home](#)
- [Home Energy Resource, Basic Care of the Home](#)

**How**

Provide comprehensive walk-through and orientation to the homeowner, renter or commercial building tenant using the Occupant Manual above that reviews the building's green features, operations and maintenance, along with neighborhood conveniences that may facilitate a healthy lifestyle.

**Intent**

A walk-through and orientation will help ensure that the Green Development Plan achieves its intended environmental and economic benefits.

# Appendix A

## Green Development Plan and Checklist

Green Development Plan

Developer Name:

Project Name:

Address (Street/City/State):

### Description of Process

A description of the process that was used to select the green building strategies, systems and materials that will be incorporated into the project. (500 word maximum)

### Project Team Members

A listing of the team members who participated in the integrated design charrette. Please include name, affiliation/company, discipline.

### Goals

Bullet points of the overall green development goals of the project and the expected intended outcomes from addressing those goals.

- 
- 
- 
- 
- 
-

Must include a **Site Plan** indicating distance of utilities and sidewalk connections as appropriate. Must include **Context Map** indicating locations of minimally required community facilities and their distances from project boundaries.

Mandatory       Optional

Completed	Item	Intended Method of Satisfying Green Criteria	Yes, No or NA	Points	Champion (name and profession/role)	Additional Comments by Applicant
<b>Section 1: Integrated Design</b>						
	1-1a	<b>Green Development Plan: Integrative Design Meeting(s)</b>				
	1-1b	<b>Green Development Plan: Criteria Documentation</b>				
	1-2	Applicant/Recipient, Architect/Project Designer, and/or Contractor Certification (Mandatory)				
	1-3a	Universal Design: New Construction (Optional 5 points)				
	1-3b	Universal Design: Gut Rehabilitation and Rehabilitation (Optional, <i>see full criteria</i> )				
Section 1 Subtotal						
<b>Section 2: Site, Location and Neighborhood Fabric</b>						
	2-1a	<b>Smart Site Location - Proximity to Existing Development (Mandatory except for rehab) (Context map must demonstrate that project satisfies this item)</b>				
	2-1b	<b>Smart Site Location – Protecting Environmental Resources (Mandatory except for infill sites or rehab) (Site and Context map must demonstrate that project satisfies this item)</b>				
	2-1c	<b>Smart Site Location - Proximity to Services (Mandatory) (Context map must demonstrate that project satisfies this item)</b>				
	2-2a	Compact Development (Optional 25 points) (Submit density calculation and documentation from local jurisdiction)				
	2-2b	Compact Development (Optional 5 points) (Site map and architect's density calculation must demonstrate that project satisfies this item)				
	2-3	<b>Walkable Neighborhoods - Sidewalks and Pathways (Mandatory) (Site map must demonstrate that project satisfies this item)</b>				
	2-4	Walkable Neighborhoods - Connections to Surrounding Neighborhood (Optional 5 points) (Site map must demonstrate that project satisfies this item)				
	2-5a	Smart Site Location - Passive Solar Heating / Cooling (Optional 2 or 5 points) (Site map must demonstrate that project satisfies this item)				

Completed	Item	Intended Method of Satisfying Green Criteria	Yes, No or NA	Points	Champion (name and profession/role)	Additional Comments by Applicant
	2-5b	Smart Site Location – Grayfield, Brownfield or Adaptive Reuse Site (Optional 15 points)				
	2-6	Transportation Choices (Optional 6 or 12 points) (Context map must demonstrate that project satisfies this item)				
Section 2 Subtotal						
<b>Section 3: Site Improvements</b>						
	3-1	Environmental Remediation (Mandatory)				
	3-2	Erosion and Sedimentation Control (Mandatory)				
	3-3	Landscaping (Mandatory - if providing landscaping)				
	3-4	Surface Water Management (Mandatory)				
	3-5	Storm Drain Labels (Optional 2 points)				
Section 3 Subtotal						
<b>Section 4: Water Conservation</b>						
	4-1	Water Conserving Appliances and Fixtures - New Construction and Gut Rehab (Mandatory)				
	4-2	No Irrigation (Mandatory existing systems grandfathered in)				
	4-3	Water Reuse (Optional, <i>see full criteria</i> )				
Section 4 Subtotal				0		
<b>Section 5: Energy Efficiency</b>						
	5-1a	Building Performance Standard: New Construction and Gut Rehabilitation: Single-family and multifamily buildings three stories or fewer (Mandatory)				
	5-1b	Building Performance Standard: New Construction and Gut Rehabilitation: Multifamily buildings, four stories or more (Mandatory)				
	5-1c	Building Performance Standard: New Construction and Gut Rehabilitation: Mixed Use with Residential (Mandatory)				
	5-1d	Building Performance Standard: New Construction and Gut Rehabilitation: Commercial (Mandatory)				
	5-1e	Building Performance Standard - Rehabilitation: Single-family and Multifamily ≤ three stories (Mandatory)				
	5-1f	Building Performance Standard - Rehabilitation: Multifamily ≥ 4 Stories (Mandatory)				
	5-1g	Building Performance Standard - Rehabilitation: Commercial				

Completed	Item	Intended Method of Satisfying Green Criteria	Yes, No or NA	Points	Champion (name and profession/role)	Additional Comments by Applicant
	5-2	ENERGY STAR Appliances (Mandatory if providing appliances)				
	5-3a	Efficient Lighting - Interior (Mandatory)				
	5-3b	Efficient Lighting – Common Areas and Emergency Lighting				
	5-3c	Efficient Lighting - Exterior (Mandatory)				
	5-4	HVAC and Duct Sizing and Installation (Mandatory)				
	5-5	Optimum Value Engineering / Advanced Framing (Mandatory)				
	5-6	Project Data Collection and Monitoring System (Optional 35 points)				
	5-7	Additional Reductions in Energy (Optional 1 point for each additional point awarded by the HERS or for each 1 percent change in energy efficiency)				
	5-7a	Renewable Energy (Optional 5 points for first 10 percent, plus 5 points for each additional 10 percent increment, up to a maximum of 15 points)				
	5-7b	Photovoltaic (PV) / Solar Hot Water Ready (Optional 5 points)				
	5-8	Advanced Metering Infrastructure				
	5-9	ENERGY STAR 3.0				
<b>Section 5 Subtotal</b>						
<b>Section 6: Materials Beneficial to the Environment</b>						
	6-1a	Construction Waste Management (Mandatory)				
	6-1b	Construction Waste Management: Additional Diversion (Optional 5 to 15 points)				
	6-2	Durable & Low Maintenance Exteriors (Mandatory)				
	6-3	Recycled Content Material (Optional 2 points for the first 5 percent, plus 2 points for each additional 5 percent increment, not to exceed 14 points)				
	6-4	Certified, Salvaged and Engineered Wood (Optional 5 points)				
	6-5a	Reducing Heat-Island Effect – Roofing (Optional 5 points)				

Completed	Item	Intended Method of Satisfying Green Criteria	Yes, No or NA	Points	Champion (name and profession/role)	Additional Comments by Applicant
6-5b	Reducing Heat-Island Effect – Paving (Optional 5 points)					
6-5c	Reducing Heat-Island Effect –Plantings (Optional 5 points)					
Section 6 Subtotal						
<b>Section 7: Healthy Living Environment</b>						
7-1	Low/No VOC Paints and Primers (Mandatory)					
7-2	Low/No VOC Adhesives and Sealants (Mandatory)					
7-3	Composite Wood Products that Emit Low/ No Formaldehyde (Mandatory)					
7-4a	Environmentally Preferable Flooring (Mandatory - if providing floor coverings)					
7-4b	Environmentally Preferable Flooring: Alternative Sources (Optional 5 points)					
7-5a	Exhaust Fans - Bathroom (Mandatory)					
7-5b	Exhaust Fans - Kitchen (Mandatory for new construction and gut rehab)					
7-6	Balanced Ventilation System (Mandatory for new construction and gut rehab)					
7-7	Water Heaters - Mold Prevention (Mandatory)					
7-8	Cold and Hot Water Pipe Insulation (Mandatory)					
7-9a	Materials in Wet Areas - Surfaces (Mandatory)					
7-9b	Materials in Wet Areas - Tub and Shower Enclosures (Mandatory)					
7-10a	Basements and Concrete Slabs - Vapor Barrier (Mandatory)					
7-10b	Basements and Concrete Slabs - Radon (Mandatory for new construction and gut rehab)					
7-11	Water Drainage (Mandatory)					
7-12	Garage Isolation (Mandatory)					
7-13	Clothes Dryer Exhaust (Mandatory)					
7-14	Integrated Pest Management (Mandatory)					

Completed	Item	Intended Method of Satisfying Green Criteria	Yes, No or NA	Points	Champion (name and profession/role)	Additional Comments by Applicant
	7-15	Smoke-free Building (Optional 2 points)				
	7-16	Combustion Equipment - Space and Water-Heating Equipment (Mandatory)				
Section 7 Subtotal						
<b>Section 8: Operations and Maintenance</b>						
	8-1	Building Maintenance Manual (Mandatory)				
	8-2	Occupant Manual (Mandatory)				
	8-3	Homeowner and Commercial/Public Building Tenant Orientation (Mandatory)				
Section 8 Subtotal						
Grand Total						

## Appendix B

### Certification of Intent to Comply

**Required: Submit this certification at time of application.**

The project applicant and project architect/project designer are required to sign the certification below at the time of application submittal to the Iowa Economic Development Authority. By signing this certification, the project applicant and project architect/project designer are certifying their intent to comply with all of the **MANDATORY** Iowa Green Streets Criteria applicable to the project as determined by the Iowa Economic Development Authority. This certification also certifies the intent to complete the optional Iowa Green Streets Criteria proposed in the applicant's proposal.

To be Completed by Applicant	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (if applicable)	
Date:	

To be Completed by Project Architect/Project Designer	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (license/ licensing body)	
Date:	

## Appendix C

### Certification of Construction Contract Document Compliance

**Required: Submit this certification prior to starting construction.**

The project applicant/recipient and project architect/project designer are required to sign the certification below prior to commencement of construction. By signing this certification, the project applicant and project architect/project designer are certifying that the construction documents comply with all of the **MANDATORY** Iowa Green Streets Criteria applicable to the project as determined by the Iowa Economic Development Authority. This certification also certifies that the construction documents comply with all optional Iowa Green Streets Criteria in the applicant's project proposal.

To be Completed by Applicant/Recipient	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (if applicable)	
Date:	

To be Completed by Project Architect/Project Designer	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (license/ licensing body)	
Date:	

## Appendix D

### Certification of Compliance at End of Construction

**Required: Submit this certification at time of construction completion.**

The project applicant/recipient, project architect/project designer, general contractor and HVAC contractor are required to sign the certification below at time of construction completion. By signing this certification, all signing parties are certifying that the project as constructed complies with all of the **MANDATORY** Iowa Green Streets Criteria applicable to the project as determined by the Iowa Economic Development Authority. This certification also certifies that the project as constructed complies with all of the optional Iowa Green Streets Criteria in the applicant's project proposal.

To be Completed by Applicant/Recipient	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (if applicable)	
Date:	

To be Completed by Project Architect/Project Designer	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (license/licensing body)	
Date:	

To be Completed by General Contractor	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (license/licensing body)	
Date:	

To be Completed by HVAC Contractor	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (license/licensing body)	
Date:	

## Appendix E

### Energy Performance Certification

**NOTE: Appendix E only applies to new construction and gut rehabilitation projects.**

**Required:**

**Residential Projects (<4 stories)** – Energy Rater submits Home Energy Rating System (HERS) certificate, Code Certificate, SAVE Reports and signs certification below for submittal by project applicant/recipient.

**Commercial or Residential (>3 stories)** – Energy Rater / Energy Professional submits Code Certificate and energy modeling information and completes and signs certification below for submittal by project applicant/recipient.

The project's independent, third-party energy rater or energy professional for non-residential projects is required to sign the certification below at time of construction completion. By signing this certification, the Energy Rater is certifying that the project, as constructed, complies with all of the **MANDATORY** Iowa Green Streets Criteria energy related criteria applicable to the project as determined by the Iowa Economic Development Authority including the following criteria:

- **5.1a, Building Performance Standard – Single-Family and Multifamily ≤ 3 stories**
  - Energy performance requirements in Energy Performance Table for 5-1a were met
  - HERS Index of 70 or better
  - HVAC SAVE total system performance score of 85 percent or better
  - For all equipment installed, meet or exceed the minimum performance requirements in the energy performance table in Criterion 5-1a
- **5.1b, Building Performance Standard – Multifamily ≥ 4 stories**
  - Exceeded the performance of ASHRAE 90.1-2010 Appendix G by 15 percent
  - HVAC SAVE total system performance score of 85 percent or better
  - Passed a pre-drywall thermal enclosure inspection
  - Installed equipment and insulation complying with Iowa Green Streets Criterion 5-1a
  - Submitted completed reports to the Iowa Economic Development Authority, including the following: energy modeling information showing adherence to exceeding ASHRAE 90.1-2010 Appendix G by 15 percent, code certificate, SAVE scores, and thermal bypass checklist
- **5.1c, Building Performance Standard – Mixed Use with Residential**
  - Exceeded the performance of ASHRAE 90.1-2010 Appendix G by 15 percent
  - HERS Index of 70 or better
  - HVAC SAVE total system performance score of 85 percent or better
  - Passed a pre-drywall thermal enclosure inspection
  - Installed equipment and insulation complying with Iowa Green Streets Criterion 5-1a
  - Submitted completed reports to the Iowa Economic Development Authority, including the following: energy modeling information showing adherence to exceeding ASHRAE 90.1-2010 Appendix G by 15 percent, code certificate, HERS Rating Certificate, SAVE scores, and thermal bypass checklist
- **5.1d, Building Performance Standard – Commercial**
  - Exceeded the performance of ASHRAE 90.1-2010 Appendix G by 15 percent
  - Passed a pre-drywall thermal enclosure inspection
  - Installed equipment and insulation complying with Iowa Green Streets Criterion 5-1a
  - Submitted completed reports to the Iowa Economic Development Authority, including the following: energy modeling information showing adherence to exceeding ASHRAE 90.1-2010 Appendix G by 15 percent, code certificate, and thermal bypass checklist
- **5.2, ENERGY STAR and Energy Efficient Appliances (if providing appliances)**

- 5.3a, Efficient Lighting: Interior
- 5.4, HVAC Sizing, Installation and Duct Systems
  - Heating and cooling equipment sized in accordance with the Air Conditioning Contractors of America (ACCA) Manual, Parts D, J and S, ASHRAE handbooks, or equivalent software

To be Completed by Energy Rater/Energy Professional	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (license/ licensing body)	
Date:	

# Appendix F

## Energy Performance Certification - Rehabilitation

Required:

**Residential Projects (<4 stories)** – Energy Rater submits HERS rating, SAVE score and Code Certificate and signs certification below for submittal by project applicant/recipient.

**Commercial or Residential (>3 stories)** – Energy Rate submits Code Certificate and energy modeling information, SAVE score and signs certification below for submittal by project applicant/recipient.

**Commercial** – Energy Rate submits Code Certificate and energy modeling information, SAVE score and signs certification below for submittal by project applicant/recipient.

The project's independent, third-party Energy Rater is required to sign the certification below at time of construction completion. By signing this certification, the Energy Rater is certifying that the project, as constructed, complies with all of the **MANDATORY** Iowa Green Streets Criteria energy related criteria applicable to the project as determined by the Iowa Economic Development Authority including the following:

- **5-1e, Building Performance Standard – Single-Family and Multifamily ≤ 3 stories**
  - HERS Index of 85 or better
  - HVAC SAVE performance test of 85 percent or better
  - Thermal imaging report provided
  - Passed pre-drywall thermal enclosure inspection
  - Passed combustion safety test, if applicable
  - Passed blower door and duct blaster test
  - Installed equipment and insulation complying with Iowa Green Streets Criterion 5-1a

**OR**
- **5-1f, Building Performance Standard – Multifamily ≥ 3 stories**
  - Energy performance meets or exceeds ASHRAE 90.1-2010 without renewable energy
  - HVAC SAVE performance test of 85 percent or better
  - Thermal imaging report provided
  - Passed a pre-drywall thermal enclosure inspection
  - Passed combustion safety test, if applicable
  - Installed equipment and insulation complying with Iowa Green Streets Criterion 5-1a

**OR**
- **5-1g, Building Performance Standard – Commercial**
  - Energy performance meets or exceeds ASHRAE 90.1-2010 without renewable energy
  - HVAC SAVE performance test of 85 percent or better
  - Thermal imaging report provided
  - Passed a pre-drywall thermal enclosure inspection
  - Passed combustion safety test, if applicable
  - Installed equipment and insulation complying with Iowa Green Streets Criterion 5-1a

**AND**
- **5-2, ENERGY STAR Appliances** (if providing appliances)
- **5-3a, Efficient Lighting: Interior**
- **5-4, HVAC Sizing, Installation and Duct Systems** (residential projects)

To be Completed by Architect, Designer, Engineer, or Energy Professional	
Signature:	
Name:	
Title:	
Tel. No.:	
E-mail:	
Accreditation: (if applicable)	
Date:	

## Appendix G

### Project Plan and Spec Book Checklist

CRITERION	PROJECT PLANS	SPEC BOOK	Architect/ Designer Initials
1.1a-b Green Development Plan			
1.3a-b Universal Design	X	X	
2.1a-c Smart Site Location	X		
2.3 Walkable Neighborhoods: Sidewalks and Pathways	X		
2.4 Walkable Neighborhoods: Connections to Surrounding Neighborhoods	X		
2.5a Smart Site Location: Passive Solar Heating/Cooling	X	X	
2.5b Smart Site Location: Greyfield, Brownfield or Adaptive Reuse Site	X		
2.6 Transportation Choices	X		
3.1 Environmental Remediation		X	
3.2 Erosion and Sedimentation Control	X	X	
3.3 Landscaping	X	X	
3.4 Surface Water Management	X	X	
3.5 Storm Drain Labels		X	
4.1 Water Conserving Appliances and Fixtures	X	X	
4.3 Water Reuse	X	X	
5.1a-g Building Performance Standards	X	X	
5.1a-g Building Performance Standards—exterior rigid insulation requirement	X	X	
5.2 ENERGY STAR and Energy Efficient Appliances		X	
5.3a-b Efficient Lighting		X	
5.4 HVAC Sizing, Installation and Duct Systems	X	X	
5.5 Optimum Value Engineering (Advanced Framing)	X	X	
5.6 Project Data Collection and Monitoring System	X	X	
5.7 Additional Reductions in Energy Use	X	X	
5.7a Renewable Energy	X	X	
5.7b Photovoltaic / Solar Hot Water Ready	X	X	
5.8 Advanced Metering Infrastructure	X	X	
5.9 ENERGY STAR Version 3.0	X	X	
6.1a-b Construction Waste Management		X	
6.2 Durable and Low-Maintenance Exteriors	X	X	
6.3 Recycled Content Material		X	
6.4 Certified, Salvaged, and Engineered Wood Products		X	
6.5a-c Reducing Heat Island Effect		X	
7.1 Low/No VOC Paints and Primers		X	
7.2 Low/No VOC Adhesives and Sealants		X	
7.3 Composite Wood Products that Emit Low/No Formaldehyde		X	
7.4a-b Environmentally Preferable Flooring	X	X	
7.5a Exhaust Fans: Bathroom	X	X	
7.5b Exhaust Fans: Kitchen	X	X	
7.6 Ventilation	X	X	
7.7 Water Heaters: Mold Prevention	X	X	
7.8 Cold and Hot Water Pipe Insulation	X	X	
7.9a-b Materials in Wet Areas	X	X	
7.10a Basements and Concrete Slabs: Vapor Barrier	X	X	
7.10b Basements and Concrete Slabs: Radon	X	X	
7.11 Water Drainage	X	X	
7.12 Garage Isolation	X		
7.13 Clothes Dryer Exhaust	X	X	
7.14 Integrated Pest Management	X	X	
7.15 Smoke Free Building		X	
7.16 Combustion Equipment	X	X	
8.1-8.3 Maintenance Manuals & Orientation - Residents & Property Manager			